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TO MY AMERICAN CONFERERS AND FRIENDS:

It is only in the last days of October (the 29th), that I received information of the changes made in the publication of the American Veterinary Review, and of the promises made to our friends, by my co-editor, Prof. Ellis, of an expression of farewell on my part, at an early date.

Distance and circumstances have not allowed me to acquit myself before this, and I do it to-day, in advancing the invoice of my usual, monthly communication for January, 1916.*

Since 40 years, or about that, when the American Veterinary Review was first trusted to my care by the UNITED STATES VETERINARY MEDICAL ASSOCIATION, and given to me afterward, I have endeavored to make it one of the best means to elevate our profession and to put it on the footing worthy of being its noble representative!

All my efforts and all my energy I have used with that object in view.

The last change and selection of the Committee of the National Association seems to say that I have not altogether failed.

But no matter how earnest and with personal disinterested

* Dr. Liautard attached this communication addressed to the American Veterinary Profession, to his chronicles for January, 1916, but having reached us in time for publication in the December issue we give them to the profession now.

motives that my endeavors may have been, they could not have succeeded or corresponded to my professional ambitious views, had it not been for the kindness, the indulgence, the support and the assistance of every nature, that all my friends in America, all our readers, collaborators and correspondents, have given me; and also the good staff I was fortunate enough to attach to the work.

It is to them ALL that I owe thanks and expressions of gratitude. It is to them that I address myself to-day; for without them, the great object of the United States Veterinary Medical Association could not have been realized.

Now, it is the JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION, which will continue the work. It has at its head, one whose efforts will never be wanting, and who will keep well in view the main original object of the creation of the journal, viz: the elevation of the AMERICAN VETERINARY PROFESSION! A bright future stands for it under his guidance.

A. LIAUTARD.

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STOCKMEN AND LIVE STOCK SANITARY CONTROL

Our country has passed through an epizootic of foot-and-mouth disease that has caused heavy losses and has tested somewhat severely our system for the control of such diseases. The outcome has been gratifying in that the disease has been practically eradicated. Notwithstanding this noteworthy victory for the country, there are those who feel that the veterinarians who directed the control work should be replaced by stockmen. The advocates of this change wish to retain veterinarians in an advisory capacity but they desire to place all administrative duties in the hands of so-called practical men. This means that quarantines shall be raised, cattle released and traffic resumed whenever laymen think it wise or expedient. They seem to feel that "practical" men would be able to control the infectious diseases better than the veterinarians who have been trained in the nature of the maladies. The inference is drawn that if stockmen had directed this work when foot-and-mouth disease broke out, its spread would have been checked and the losses sustained from it would have been much smaller.

It would seem that those who wish to subordinate the veterinarians in sanitary work do not recognize the fact that under the present regime veterinarians are officially under laymen in prac-

tically every position they hold. The Chief of the Bureau of Animal Industry is under the Secretary of Agriculture. Official veterinarians in the states are, in nearly all if not in every instance, under the Commissioner or the Board of Agriculture or a live stock sanitary board composed of laymen. In this epizootic of foot-and-mouth disease, as in times of other epizootics, the lay officials responsible to the people for their control necessarily depend upon the recommendations of their veterinarians. It is interesting to note, that few if any of these officials have criticised the action of the veterinarians in their employ relative to their recommendations or acts in connection with the recent outbreak of foot-and-mouth disease. These men understand that they must have technical advice and further they know how difficult the work has been and how easy it is to make mistakes. The loyal support of the veterinarians by the lay officials immediately over them is most gratifying. It speaks well for the efficiency of the system of organized veterinary service in this country.

The proposition to replace official veterinarians by stockmen, thus placing the technical work one step farther removed from the power to act, should be carefully considered. Fortunately we have examples of the action of laymen in regard to infectious diseases which should be reviewed by those who feel that men untrained in sanitary science should be given still greater authority in the handling of animal plagues. If recorded statements are correct, the dissemination of infectious maladies, not only in this but in other countries, can be traced largely to the action of stockmen who, in their transactions, have not taken into full consideration the restrictions or the requirements necessary for the prevention of the spread of the disease. By their methods, such plagues as tuberculosis, glanders, infectious abortion and hog cholera have become widespread, causing annually losses amounting to tens of millions of dollars more than the past outbreak of foot-and-mouth disease, serious as it was. It has been the stockmen themselves who, in their dealings, have defied the knowledge of the laws of infectious diseases and by their unguarded, though well meaning actions, have permitted these maladies to be scattered broadcast in our land. It has been largely the animal owners or those dealing in live stock who have opposed most strongly legislation recommended for the better control of these diseases.

It is not necessary to restrict the analysis to violation of know-

ledge concerning the spread of the more common infectious maladies. History shows that laymen have been responsible for the spread of the most serious plagues of animals from one country to another. We are told in the records that it was the importation of cattle which had had contagious pleuro-pneumonia from Europe to Africa and Australia that introduced this terrible disease of cattle in those countries. It was cattlemen who took this same disease from Australia to the Philippine Islands. It was a cattleman who but a few years since would have unintentionally introduced surra into this country had it not been for the wisdom of the Bureau of Animal Industry in securing, some years since, a national quarantine against the importation of cattle and the vigilance of the veterinarians in that Bureau in detecting this infection in the imported animals while they were still in quarantine. Again, the introduction of dourine into this country by importing an infected stallion can be traced to laymen. If we go still further back in the history of these and other animal plagues we find that a century and a half ago they became a serious menace to the live stock industry of Europe. Because animal owners and those engaged in live stock dealings were unable to check their spread, European governments established veterinary colleges for the immediate purpose of training veterinarians to take charge of and direct the control work. It is significant that in those countries where veterinarians are given the greatest amount of authority and support there is the least amount of trouble with animal diseases.

Is it reasonable to expect that laymen who are not trained in the parasitism of infectious diseases; who do not grasp the danger of the infected but apparently well animal; who do not appreciate the subtle power of "bacilli carriers" or occult cases; who do not know the intricate questions involved in a quarantine; and who do not understand the variety of manifestations of infectious diseases, would be able to initiate precautionary measures of sufficient breadth and rigidity to prevent the spread of the viruses of these affections?

The work of veterinarians in this country, acting under the authority and with the consent of their superior officials, is also a matter of record. It was the knowledge of the diseases of animals that enabled, in the early eighties, the late Dr. Salmon to persuade Congress that a Bureau of Animal Industry should be established in the United States Department of Agriculture to guide efforts in combating infectious animal diseases. At that time this country

was invaded by contagious pleuro-pneumonia of cattle, a disease that had cost Great Britain and continental Europe untold millions and which was threatening the cattle industry of America. Having obtained authority, a scientific campaign of eradication was waged, often in the face of bitter opposition, with the result that the disease was eliminated in 1892. Until veterinary advice, based on special research, was heeded, the northern states were visited almost annually by Texas fever, which resulted in a heavy loss of cattle. It was the veterinary service, centered in the Bureau of Animal Industry, state departments and live stock sanitary boards, that has cleared this country of foot-and-mouth disease on previous occasions. It was heeding the advice of veterinarians that enabled Great Britain to eradicate contagious pleuro-pneumonia and rabies from the British Isles and to keep the latter out of Australia altogether.

So far as can be ascertained from the discussions on this subject, the bases for the proposed change are largely misunderstandings. The veterinarians were in no way responsible for limits of value to be paid for condemned animals, especially the pure bred stock. The methods of eradication that required the slaughter of exposed as well as diseased animals were not of their motion but the results of scientific investigations and experience with the disease in other countries. Because all stock owners were not ready and willing to co-operate in the enforcement of these methods there is no reason for changing the source of authority, for the *procedure must be the same* if the disease is to be eradicated. A very casual inquiry will show that live stock sanitary regulations must be directed by men trained in the basic sciences which, brought together, compose the veterinary curriculum. The only place where these subjects are correlated and taught is in a veterinary college. It is not unlikely that in the near future certain veterinary colleges may give additional work in sanitary science for the specific purpose of training more carefully a certain number of veterinarians for this special service. It is hoped that such a course may soon materialize. Live stock owners, however, should consider in this connection that such special preparation is expensive in both time and money and that individuals cannot afford to qualify unless they are assured of the support of the state and stockmen after they have thus prepared themselves.

When the interests of the live stock industry are fully considered, there seems to be no rational basis for the proposed replac-

ing of official veterinarians by "practical" laymen. The only men to deal with these important subjects are those who have an intimate knowledge of them. If the veterinary service is not satisfactory or as efficient as it should be, it would seem more reasonable for those who are dissatisfied to give the veterinary profession their moral, financial and educational support in order that it may attain to a degree of efficiency necessary to accomplish *all* that can rightfully be expected of it rather than to replace the veterinarian with men technically unqualified. When the disharmonies are corrected, the personal equations eliminated and all the facts brought to light, it is confidently believed that the only changes that will be necessary for satisfactory live stock sanitation and control of epizootics will be a more loyal support to the veterinarians charged with this work. In this country, the veterinary profession is still young, and both national and state governments have much yet to do by way of perfecting their organizations. Contagious pleuro-pneumonia resulted in giving us the Bureau of Animal Industry and this outbreak of foot-and-mouth disease should give to each and every state a better organization of veterinarians for public service. A system of district veterinarians armed with authority to act promptly on all matters pertaining to the introduction, spread or control of infectious and epizootic diseases should be as effective in this country as it has been in Germany. The lesson taught by all epidemics and epizootics as well as by the more common experiences of life is, that for success in technical work technically trained men are necessary.

V. A. M.



EUROPEAN CHRONICLES

NEMATODES AND THEIR TREATMENT

The *Recueil de Medecine Veterinaire*, which, on the declaration of war in August, 1914, had been forced to arrest its publication has made its reappearance, and the XCI volume will be completed by the numbers which will now successively appear up to the end of 1915. A whole year 1914-1915 will thus be formed. All readers of the *Recueil* the oldest means of propaganda of French Veterinary Science, will no doubt welcome back their old friend.

The present number contains from Prof. A. Railliet of Alfort a long article on the use of *drugs* in the *treatment of the diseases caused by nematodes*, which was a report that the learned Professor

presented to the International Congress of London. The subject is immense and can not be treated in all its details and only the principal parts relating to it can be considered.

First of all, Prof. Railliet gives full consideration to the enumeration of the most important forms of nematodes that are found in the digestive apparatus, as they occupy this or that part of the digestive canal, stomach and various portions of the intestines in the domestic animals, the ascaridæ, heterakidæ, oxyuridæ, strongylidæ, trichostrongylidæ, dioctophymidæ, spiruridæ, trichuridæ, gnathosiomidæ, anguillulidæ, rhabdiasidæ, and the sub-families of some of these are presented with reference to the species of domestic animals in which they are found and the portion of the digestive canal where they are met.

First come a few considerations of the precautions, which must be taken, such as the necessity to have the treatment preceded by a kind of preparatory cure to render the parasites more accessible to the action of the anthelmintic drugs, when complete or milk diet is then indicated. It is also important to bear in mind the seat occupied by the parasites. If the expulsion will generally be easy to obtain when the *stomach* or *small intestine* is the place of habitation, there may be some difficulty when in the presence of some anatomical condition, as is the case in bovines. Again when the parasites are in the *large intestine* the administration *per orem* often remains inefficacious, and one must have resort then to interference *per anum*.

Then the examination of the treatment begins.

First come the *nematodes of the small intestine*. Against the ascarids of monogastric mammalia, two drugs seem to be advocated by practitioners, tartar emetic and arsenious acid. Although sulfide of carbon, spirits of turpentine, thymol, etc. are also recommended by many.

Against ankilostomiasis of dogs, thymol or the treatment used in the human form of the disease is recommended.

For the heterakidæ of fowls, there are many drugs which have been recommended, but the efficacious remedy is yet to be found.

The nematodes of the abomasum and small intestine of cattle require peculiar care. Creosote, in preference to that of coal-tar, alone or with thymol, is very useful. Sulfate of copper, phenicated water, spirits of turpentine, etc., etc., have also been used.

The nematodes of the large intestines are hard to dislodge, when

drugs are given by mouth, and evidently the chances for success are greater if they are administered per rectum—thymol, injections of atoxyl.

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The principal nematodes of the respiratory apparatus are the syngamidæ, the metastrongylidæ, and the trichuridæ. The second of these are the most important from the economical point of view, giving rise by their presence to verminous bronchitis or to verminous pneumonia.

Among the many old modes of treatment which, unfortunately, have not always constant efficiency, may be mentioned the fumigations of tar, aromatic substances, phenic acid or creosote. The intra tracheal injections recommended by Levi are of little practical application. Spirit of turpentine, chloroform, benzine, creosote, formol, etc., have been tried with almost negative results.

If injections have been finally put aside, creosote sprays seemed to give better results. It is probably the best method, providing the pulverizator is a good instrument and works well.

In the same category of nematodes of the respiratory apparatus, there comes the syngamosis which causes such severe losses among fowls.

Fumigations and intratracheal injections are the only methods that can be recommended. Carbolic acid and tobacco smoke inhalations have done good. Salicylate of soda in intratracheal injections seems to give the best results of all. Eucalyptus has also its advocates.

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In a third chapter, the *nematodes of the circulatory apparatus* are considered. These worms are found in the blood and lymphatic vessels in various stages of their evolution. But few are the attempts that have been made to reach and destroy them. Intravenous injections of atoxyl, tartar emetic, aniline, etc., have been tried in human medicine, but none with positive marked results.

The *nematodes of the closed cavities and tissues* occupy a fourth chapter. Quite a number of these parasites, inhabit serous cavities, which belong to the filaridæ. Others live in the viscera or in deep tissues, again others in tendons, coats of blood vessels, and subcutaneous connective tissue. But against all these parasites we are almost disarmed. The attempts at treatment which have been made have given almost insignificant results, and yet they must not be abandoned.

Some nematodes are also found in the thickness of the skin, the cause of the granular dermatitis of horses and cattle. Against this, the permanganate of potash in solution has been lately highly recommended, in injections round the seat of diseased parts.

For the *nematodes of the urinary apparatus*, Railliet in the following chapter, says that up to this day no therapeutic treatment has been tried against the strongylidæ, the dioctophymidæ or the trichuridæ that may exist in the urinary organs. Agents possessing diuretic and anthelmintic properties might be recommended.

The *nematodes of the apparatus of vision* belong to two distinct families, the filaridæ and the spiruridæ. The former are intra-ocular and are treated by extraction with puncture of the cornea. Yet the use of ointment, under the eyelid, of red oxide of mercury, or of weak tincture of aloes has been used successfully. Also the internal administration of sulfuret of mercury.

The spiruridæ or extra-ocular nematodes are successfully treated by washing the eyes with a solution of bicarbonate of soda or cerolin, 1 or 2%.

ANTITETANIC SERUM AND ACCIDENTS,

I do not know to what extent our friends of the *Review* have recourse on themselves to the protective use of the serum when by some way or another they may, in the performance of their various professional duties, be exposed to tetanic infection.

However, the statement made by a veterinarian Mr. R. Parent before the *Société de Pathologie Comparée* and reported in the *Revue* of this organization, will prove very interesting and instructive. The case gets a greater value from the fact that it is a direct observation, noted on himself where all the manifestations he personally felt are usefully described as follows:

"Having on the hands, sores which had been soiled by pus from a horse suffering with very acute tetanus, I received (says Mr. Parent) an injection of antitetanic serum, with all the aseptic attention possible. It was followed by slight soreness at the point of injection and disappeared after two days. That was on Sunday; on the following Tuesday and Wednesday, there was slight itching at the point of injection. On Thursday, the left upper eyelid itched, the conjunctiva was affected and a marked flow of tears took place. This lasted some three hours, when with a violent feeling of soreness,

the lips began to swell, lost their natural shape, and gave the impression of having been severely bruised. Then there appeared on the hands and feet a severe itching sensation, which rapidly extended to the arms, thighs and lower part of the abdomen. The itching was followed by the appearance of numerous little elevations, analagous to pricks of needles, which soon gathered and formed a wide red patch with an edematous swelling round it. This subsided gradually but the itching returned more severely, then subsided, to reappear from one place to another. A small quantity of urine was passed. It was yellow and contained some albumin."

While making the examination of the urine, Parent was seized with general weakness, his limbs seemed to refuse to support him. He reached a chair, could hear all that was said to him but was unable to answer a word. He was put to bed, the itching returned again and finally subsided with all the other manifestations during the night and the following morning.

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After this description of the series of accidents to which he had been submitted and which lasted several days, Parent continues in his report, "These few detailed facts show that I have had a series of accidents following the injections of antitetanic serum and I remembered that in 1906 I had had one injection for a wound made with the calk of a shoe that I was taking off from a diseased foot, and I remembered also that I had another in 1910 for a bite on a finger. For four years then, I had kept in my organism sensibilities and the question may present itself if repeated injections are not useless or dangerous when made for wounds of long duration."

A similar observation was also recorded as having been observed on the partner of Mr. Parent. He had pricked himself with the needle of the syringe which had served to make an intravenous injection of serum in the same horse which had soiled Mr. P.'s hands. For 24 hours the partner had similar manifestations of itching, eruptions, etc. The partner had also received injections of antitetanic serum four years before.

A horse suffering from anasarca was treated with polyvalent streptococcic serum, and had also an injection of antitetanic serum, but presented no peculiar symptoms from it.

From the consideration of these cases the following conclusions are justified:

"I. In a man who has received 2-3 injections of antitetanic

serum there remains in him, even after four years, sufficient sensibility for serial manifestations to take place after a new injection of said serum.

"2. The manifestations have occurred in the two cases recorded between five and six days after the injection of the serum, which is a time rather longer than in the production of the ordinary anaphylactic phenomena.

"3. Horses that have received very large doses of polyvalent antistreptococcic serum can, without inconvenience, receive antitetanic serum injections."

PYOCULTURE AND OPSONIC INDEX

In a comparatively recent chronicle, I called the attention of our readers to the method described before the *Academie des Sciences* here, on the value of the pyoculture in the prognosis of wounds.

The author, Prof. Delbet, on the same subject and in comparing it with the opsonic index recalls the question in a few words, presenting the principle and the technic of his method, that of pyoculture.

The method consists in cultivating the microbes, in the very secretions of the wounds and to draw from the examination of the cultures our appreciation on their prognosis.

The technic is very simple. It consists essentially in taking the pus with an ordinary pipette; and, placing one drop of that pus on a slide to make immediately a preparation. Another drop is dropped in a tube of peptonized bouillon, and then the pipette is closed in the alcohol lamp and placed in the hot air chamber, but kept in a damp room to prevent its dessication. After 24 hours a preparation is made with the pus of the pipette and one with the bouillon. From the comparison of the three preparations, indications on the prognosis are drawn.

The idea of Mr. Delbet was that by placing the pus itself in the conditions of temperature favorable to the development of microbes, it would, so to speak, be possible to measure the struggle which takes place between the pathogenic agent and the resistance of the organism.

Experiments have shown that it is such and it is sufficient to compare the results of the cultures of pus with those of the pyo-

culture. In some cases, the microbes develop in much greater abundance in the pus than in the bouillon; it is proof that the secretions from the wound are peculiarly favorable to the microbes or that they have adapted themselves to them; the organic defenses are insufficient or without effect; the pyoculture is called *positive* and the prognosis serious. In others, on the contrary, the microbes develop in the bouillon and not in the pus, pyoculture does not take place; the organism is struggling. There are even cases, where the microbes diminish in the pus; they are bacteriolized, while they multiply in the bouillon; the pyoculture is *negative*, the prognosis favorable, the organism will succeed. Finally in some cases, it is not the same microbes that develop in a marked manner in the pus and in the bouillon; the pyoculture is *elective* and the results must be analyzed.

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Other investigators have verified in an affirmative manner all the facts of pyoculture, but they have observed others which made them establish a comparison between the results of pyoculture and those of the opsonic index.

Mr. Delbet had also taken this comparison into consideration and it had seemed to him that the opsonic index could not give information in some local phenomena. When a patient has two wounds, one may be doing well, the other not. If both are injected with the same microbe, the opsonic index must be at least in favor of one of the two.

And again, to measure the opsonic index, cultures must be used; and it frequently happens that the microbes, which predominate in the bouillon are not those which are in the pyoculture. In these conditions, the results of the opsonic index are unavoidably vitiated, as long as the greatest number of microbes presented to phagocytosis are not of the species which causes the principal infection. The demonstration is evident.

While these investigators were making pyocultures, another was establishing the opsonic index of the same patients. The comparison of the results obtained by these workers were that the opsonic index most often corresponds to the pyoculture. In the cases where the results differ, it is the pyoculture which agrees with the clinical evolution, and the opsonic index which is at fault.

In conclusion, without desiring to criticize the theory of the opsonins, the writer says that:—"In all cases, it is to pyoculture

that most faith must be placed in the cases where the results differ from those given by the opsonic index." Pyoculture is much simpler and much easier; a simple morphological and quantitative examination is sufficient, and to practice it one need not be an experienced bacteriologist. Its practical value has been demonstrated.

BLOOD SERA AND HEMORRHAGES

Dr. P. E. Weil has written recently for the *Presse Medicale* an article on the subject with their applications and their indications, which offer to the reader a general interest. Indeed in the last twenty years, the therapeutic arsenal has added to her provisions a series of new agents which seem to possess a real efficiency against hemorrhages, such as gelatin, chloride of calcium, adrenalin, sera from the blood, pituitrine, emetine, etc., substances which have given important results and deserve not to be ignored.

At the same time, sera from the blood are those which the author desires to consider, principally in cases where hemophily is present. He has recommended them since 1905, has made numerous experiments with them and has finally come to the following conclusions:—1. The serum that modifies the blood of such individuals, the hemophilous, possesses a preventive property against their hemorrhages and its administration presents a great surgical interest. 2. The injection of serum is able to arrest an hemophilic hemorrhage in quite a short lapse of time.

Both of these conclusions have been confirmed by many authors in France and foreign lands, and the records that have been made, have permitted Dr. Weil to confirm the curative value of the sera and to extend their use not only to the cases of dyscrassie hemorrhages, but also to all serious hemorrhages in general.

At first it was the fresh human serum that was resorted to, that is a serum obtained by an aseptic vivisection on a healthy man twenty-four hours before it was used. From specific causes the use of this serum was not practical and others were looked for.

Animal sera, though having a less active curative action, gave good clinical results and then the serum of the rabbit, bovine and horse was tried.

The first was given up, because of the small quantity of serum that only one animal could give.

That of bovines was also laid aside, although it proved itself

very active, because it frequently gave rise, even with the first injection to toxic accidents quite serious.

The serum of the horse does not offer any of these objections, and it is the one that must be used.

The article of Dr. Weil is then continued by the consideration of the physiological and the therapeutic action. With the mode of administration, the injections are given sub-cutaneously intramuscularly or intravenously. The former are the best and the simplest. There are even indications to resort to the direct application upon a bleeding surface. But it must be remembered that in such cases to obtain a hemostatic action, it is essential that the serum and the wound should be in perfect contact—therefore, before applying it, the surface of the wound must be minutely cleared of all clots.

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A. L.

FOOT-AND-MOUTH DISEASE WITH SPECIAL REFERENCE TO THE OUTBREAK OF 1914-1915*

JOHN R. MOHLER, Washington, D. C.

INTRODUCTION. During the past year a widespread outbreak of foot-and-mouth disease has passed over the United States, the most serious and extensive that has ever occurred in this country. The disease has been found in 22 States and the District of Columbia, at places ranging from the Atlantic to the Pacific coast. Previous outbreaks in this country have been limited to comparatively small areas. The latest invasion was discovered in the vicinity of Niles, Michigan, in October, 1914 after it had evidently been under way since August of the same year. Unfortunately the mild form and atypical appearance of the first cases permitted the disease to spread without recognition to a considerable number of herds of cattle and hogs. Some of the latter reached and presumably infected the stock yards at Chicago, from which it was disseminated to other stock yards and to points north, east, south and west, by shipments of live stock, especially stockers and feeders.

SOURCE OF INFECTION. Many theories of the manner in which the infection was introduced into the United States have been advanced and all those which permit of investigation have been diligently studied and disproved. Among those theories which have been thoroughly investigated with negative results are the introduction of the virus with small pox vaccine from vaccine establishments in Michigan and Massachusetts, with calf dysentery serum imported from Europe, by intentional dissemination of the disease by men equipped with hypodermic syringes, by imported hides, Belgian refugees, Russian immigrants, etc. There still remain two plausible theories which can neither be proved nor disproved. First, the farmer Mr. X, on whose premises foot-and-mouth disease first made its appearance, purchased from a Chicago firm certain merchandise including two pairs of lisle gloves imported from Germany. The paper used in packing and wrapping these gloves was thrown into a hog lot about ten days before the hogs began to show a disease which subsequently proved to be foot-and-mouth disease. These hogs were the first animals to develop the disease in the 1914 out-

* Presented at the meeting of the A. V. M. A. Section on Sanitary Science and Police. Oakland, Cal., Sept., 1915.

break. Second, the infection may have been brought to Niles, Michigan, by burlap or matting from tannery materials imported from Argentina and Japan. These wrappings are frequently taken by tannery employees for household and farm use and their homes are located in the vicinity of the farm of Mr. X.

HISTORY OF THE INFECTION. When two weeks after the first hogs became sick the disease spread to the cattle on the same premises and simultaneously the cattle belonging to a neighbor developed peculiar symptoms. Each of the farmers called in a different local practitioner, one of whom several days later notified the State authorities of the conditions present and requested assistance. The first information that reached Washington was a telegram from an assistant inspector at Detroit on September 3 stating that he intended to visit Niles, Michigan, with the State Veterinarian to investigate a possible outbreak of Aphthous Fever at the latter's request. Reports sent at this time to Washington stated there were no indications of foot-and-mouth disease but that the lesions were characteristic of necrotic stomatitis. Nothing further was heard from the disease by the Washington office from this date until October 10 when a letter arrived from the inspector in charge of the Detroit force stating that the disease had spread during the interval from the original two herds to six additional herds in the neighborhood. In this letter no diagnosis was made of the disease but the history of the various herds was so completely described that no affection other than foot-and-mouth disease could suggest itself. Therefore, Dr. Eichhorn was sent on the next train to investigate and report. Three specimens from the lesions of the affected animals were turned over to Dr. Mohler, who immediately proceeded to the Experiment Station at Bethesda, Maryland, and that evening inoculated three calves, each receiving an intravenous injection as well as an inoculation on the dental pad. On October 12 Dr. Eichhorn wired a report stating that the clinical appearance was positive and requesting that Mohler be sent to Michigan to confirm the diagnosis. Dr. Melvin wired in return to Dr. Eichhorn instructing him to inoculate a calf and stating that Dr. Mohler was keeping the three calves, inoculated at the Experiment Station, under close observation, but would be sent to Michigan within 48 hours if no developments appeared. No symptoms of the disease developed by this time in the calves at the Experiment Station and Dr. Mohler proceeded to Niles, Michigan, arriving there at 6:30 o'clock

on the evening of October 15. He was met by Dr. Eichhorn and taken by automobile to an infected farm where an examination was made by the aid of an electric flashlight. After an examination of a number of the animals Dr. Mohler agreed that it was indisputably the European disease and a wired report was sent to Washington that night to this effect and requesting additional men to assist in the work of eradication. Active scouting by all available veterinarians starting on the morning of October 16 uncovered 39 infected herds in Michigan. On the following day, October 17, a number of additional infected herds were located in northern Indiana. A recommendation was made on that date that four counties, Berrien and Cass in Michigan, and St. Joseph and Laporte in Indiana, be placed under quarantine, which became effective on October 19.

In this connection it is interesting to note that notwithstanding Berrien County all told had 191 infected herds, which is more than any other county in the country, the adjacent county of Cass never developed a single case of the disease. After the quarantine went into effect on these four counties everything was going along smoothly and rapid progress was being made in eliminating these centers of infection. When I reached Niles on my second visit of October 27 a report had just been received from Blissfield, Michigan, that some steers from Chicago were sick. In company with Michigan officials I left for Blissfield at once arriving early the next morning, October 28. Three of the steers were found to be infected with very acute lesions of foot-and-mouth disease, while the others in the carload lot had not, as yet, developed any symptoms. As a result Lenawee and Monroe Counties, Michigan, were quarantined effective October 29. The three infected steers referred to were in a carload lot that left Chicago nine days before, and it then became a question whether the Chicago stock yards were infected or whether the steers had been shipped in an infected car. Furthermore, this was the first information anyone had that the Chicago yards might be infected, although certain individuals have evidently tried to give the impression that the Bureau had knowledge of this shipment to Michigan prior to the opening of the Dairy Show on October 22. Subsequently it was found that the three steers above mentioned reached Chicago in a lot of 49, the other 46 animals going to Chenoa, Illinois as one shipment, but they never developed any indications of foot-and-mouth disease, al-

though examined frequently. This, at least, suggested that the three Blissfield steers picked up the infection outside of the Chicago stock yards and after they had been taken from the original shipment of 49 to complete the carload lot destined for Blissfield. While a thorough investigation failed to locate infection more definitely in the Chicago stock yards it was decided to take all precautionary measures and as a result an order was issued effective October 31 quarantining the Union Stock Yards at Chicago. At the time this order went into effect the National Dairy Show cattle were in the barns of the Union Stock Yards Company, having been held for observation by the State Veterinarian of Illinois on October 29 at the request of the Bureau, and in addition a large number of stockers and feeders, as well as fat stock, were in the pens of the Union Stock Yards Company. The day following the quarantine of the Chicago yards (November 1) a Holstein cow in the Dairy Show belonging to an exhibitor from Minnesota developed unmistakable lesions of foot-and-mouth disease and two days later (November 3) several of the feeders which had been caught by the quarantine order and which were not purchased by the local packers for slaughter because of their slight value from a butcher's standpoint, likewise developed the disease. And the discovery of these cases in the Dairy Show barn and feeder section of the Chicago stock yards was the first knowledge anyone had that foot-and-mouth disease existed in Chicago.

About this time the products of a certain hog cholera serum company in Chicago became infected with the virus of foot-and-mouth disease. A careful investigation developed the fact that no serum shipped out from the plant of this company was contaminated with foot-and-mouth disease. One lot of virus, however, was so contaminated. This lot of virus was comparatively small, it being composed of 3400 c. c. of blood obtained from four pigs. These pigs were not purchased sick in the stock yards, but were well at the time they entered the establishment on October 16. They were then inoculated with hog cholera virus with the intention of using their blood in connection with administering the serum-simultaneous treatment. On October 26 these hogs were killed to furnish hog cholera virus.

The lesions found in these four pigs were only those of acute hog cholera, but evidently they were also in the incubative stage of foot-and-mouth disease. It is a well-known fact that the virus of

foot-and-mouth disease is present in the blood only in diluted quantities and then only at the beginning of the fever, before the vesicular eruptions appear. The blood will carry the virus of foot-and-mouth disease without possibility of detection except by animal inoculations, when the hogs are killed at this stage. The blood from these pigs was mixed and most of it shipped out to customers of the concern in Ohio, Indiana, Illinois and Iowa. On November 3, the inspector in charge of the plant had his suspicions aroused by sickness appearing in certain hyperimmunized hogs. This was late in the day and he visited the plant at daylight on November 4. He immediately quarantined the plant for foot-and-mouth disease, because the hogs noticed sick the evening before were worse and showed lesions of foot-and-mouth disease. All of the employees and the entire establishment were disinfected. The infection of the plant was due either to the promiscuous passing of the owners and employees of the company to and from the infected Chicago stock yards, or to the purchase of hogs exposed in those yards.

At this point the question naturally arises how and when did the Chicago yards become infected. It is impossible to make an accurate answer to either of these queries but it is logical to assume that a shipments from the original infected area of certain live stock in the incubative stage of the disease was the responsible factor. Thus when the tracing of cars began the disquieting information was disclosed that a mixed shipment containing 28 hogs, 3 cows and 54 sheep had been sent on October 8 from the vicinity of Niles to Chicago. Almost simultaneously it was discovered that the milk from an infected herd had been taken to a creamery daily for the previous two weeks and the return of the infected skimmed milk to the patrons of this creamery resulted in the rapid spread and almost spontaneous appearance of the disease on 36 farms, which number increased to over 100 before the creamery could be closed. The hogs in the Chicago shipment were among the first to receive this contaminated skimmed milk and their shipment to Chicago before the the development of the disease probably infected the Union Stock Yards.

Furthermore, the Department has learned of a number of instances where farmers and attendants from infected premises had visited the Chicago yards and infection could easily be carried by them from these infected farms to the Union Stock Yards since the reverse (farmers carrying the disease to their cattle after visiting

these yards) has been definitely proved in a number of cases. As soon as the infected steers were found at Blissfield instructions were given to trace all shipments out of Chicago since October 1, but no disease was found until November 1 in Kane and Kendall counties, Illinois, in cattle which had left Chicago October 20 and 21, respectively. In fact the evidence obtained as a result of tracing all shipments out of Chicago after October 1 clearly shows that no infection was carried with those shipments prior to the time the Blissfield steers were shipped on October 19 which, as before mentioned, do not incriminate those yards, and that the greatest number of shipments which carried infection into Illinois, Iowa, Michigan, Wisconsin, Ohio, Kentucky, and Pennsylvania left Chicago on October 21, 22, 26, 27, 28 and 30. As a direct result of the thorough work in following up all such shipments Illinois, Michigan, Indiana and Pennsylvania were quarantined November 2; Maryland and New York November 4; Ohio and Wisconsin on November 5; Iowa on November 6; and Montana on November 16. Massachusetts was also quarantined on November 6; Delaware, New Jersey and Rhode Island on November 9; Connecticut on November 16; Loudon County, Virginia, November 27; two counties in New Hampshire on December 1; four counties in Kansas on February 1; one county in West Virginia on March 1; two additional counties in Virginia on March 8; and one county in Minnesota on August 12.

As the eradication work advanced it was found advisable to maintain several different quarantine measures in the infected States and for the purpose of aiding in the recognition of these restrictions the following definitions were enacted:

(a) Quarantine Area: Any State or any portion thereof quarantined for foot-and-mouth disease in live stock.

(b) Closed Area: Those portions of the quarantined area into which the interstate movement of cattle, sheep, other ruminants, and swine is permitted, for immediate slaughter only, and from which the interstate and foreign movement of such animals is absolutely prohibited, and the movement of the dressed carcasses of such animals, the hides, skin, wool, hair, horns, or hoofs of such animals, and of hay, straw, similar fodder, manure, litter, or bags or similar containers which have been used for stock feed is restricted.

(c) Exposed Area: Those portions of the quarantined area from which the interstate movement of cattle, sheep, other rumi-

nants, and swine is permitted for immediate slaughter after inspection and certification, and into which such animals may be moved for any purpose, also from which the interstate and foreign movement of the dressed carcasses of such animals, the hides, skins, wool, hair, horns, or hoofs of such animals, and of hay, straw, or similar fodder, manure, litter, or bags or similar containers which have been used for stock feed, is restricted.

(d) Modified Area: Those portions of the quarantined area from which the interstate movement of cattle, sheep, other ruminants, and swine is permitted for immediate slaughter without inspection, to points in the quarantined area, and into which such animals may be moved for any purpose, also from which interstate and foreign movement of the dressed carcasses of such animals, the hides, skins, wool, hair, horns, and hoofs of such animals, and of hay, straw, or similar fodder, manure, litter, or bags or similar containers which have been used for stock feed is permitted without any restrictions whatever.

(e) Free Area: Those States or portions thereof which are not quarantined for foot-and-mouth disease.

On February 17 after the Chicago yards were found to have been reinfected and the disease appeared to have gained another foothold, a new feature in the quarantine orders was inaugurated termed a "restricted" area, which had for its purpose the restriction of the infection to the already infected states with a view of keeping the great western country and the Southern states free from the disease.

(f) Restricted Area: Those portions of the quarantined area from which the interstate and foreign movement of cattle, sheep, other ruminants, and swine is permitted for immediated slaughter to points in the free and closed areas, or for any purpose to any point which is or has been in the quarantined area since October 1, 1914, other than in the present closed area, and into which the animals may be moved for any purpose; also from which the interstate and foreign movement of the dressed carcasses of such animals, the hides, skins, wool, hair, horns, and hoofs of such animals, and of hay, straw, or similar fodder, manure, litter, or bags or similar containers which have been used for stock feed, is permitted without any restrictions whatever.

Prior to the adoption of the restricted area the states of Washington, Kansas and Montana had received infected cattle from what

The following table shows the number of herds slaughtered in each state, together with the methods by which infection was transmitted.

SOURCE OF INFECTION																							
	Connecticut	Delaware	Dist. of Col.	Illinois	Indiana	Iowa	Kansas	Kentucky	Maryland	Massachusetts	Michigan	Montana	New Hampshire	New Jersey	New York	Ohio	Pennsylvania	Rhode Island	Virginia	Washington	West Virginia	Wisconsin	TOTAL
1. Through animals brought direct from infected public stock yards for slaughter, feeding, breeding or dairy purposes...	2	2	0	89	19	9	0	26	19	25	29	4	0	21	45	94	289	19	4	1	0	10	707
2. Through animals brought from infected stables or lots of local dealers.....	21	0	0	20	4	0	0	12	14	17	2	0	1	0	15	25	121	9	3	0	18	3	285
3. Through direct contact with neighboring infected herds, by pasture, mating, breeding animals, or animals not confined	4	6	1	115	8	13	0	31	8	6	9	25	0	2	9	29	65	13	0	0	0	2	346
4. Through infected railway cars.....	0	0	0	9	0	0	0	0	0	0	1	0	0	0	4	0	1	0	0	0	0	0	15
5. From creameries.....	0	0	0	25	0	0	0	0	0	0	21	0	0	0	33	2	86	0	0	0	0	2	169
6. From vaccination with infected hog cholera virus.....	0	0	0	94	5	2	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	121
7. Through persons—																							
(a) Neighborhood visiting, exchanging work, etc.....	3	0	1	147	14	9	3	8	5	18	2	0	1	15	21	25	119	4	0	0	2	5	402
(b) Through local practitioners or dairy inspectors.....	0	0	0	10	1	0	0	1	2	3	0	0	0	0	0	0	24	0	0	0	0	0	41
(c) By stock buyers, peddlers, etc.....	0	0	1	9	0	3	0	0	5	8	0	0	0	0	12	4	18	5	0	0	0	1	66
8. Through dogs, poultry, birds, etc.....	0	0	0	92	0	7	1	0	1	3	2	0	0	0	8	5	9	7	0	0	0	11	146
9. Through infected public highways.....	0	3	0	10	0	0	0	0	0	0	0	0	0	0	0	3	8	0	0	0	0	0	24
10. Through contaminated streams or drinking water.....	0	0	0	1	0	0	2	0	0	1	0	0	0	0	0	3	12	0	0	0	0	0	19
11. Through infected feed or garbage.....	1	0	0	0	1	0	0	0	0	3	0	0	0	5	1	1	9	1	0	0	0	0	22
12. Other known sources of infection.....	0	0	0	7	1	0	0	0	1	2	0	0	0	1	26	2	13	0	1	0	1	0	55
13. Sources of infection unknown.....	2	1	0	140	67	5	0	6	1	12	206	3	1	6	6	9	130	1	0	0	1	6	603
TOTAL.....	33	12	3	768	120	48	6	84	56	98	272	32	3	50	180	229	904	59	8	1	22	40	3021

had been supposed to be clean territory and as a result it was necessary to eradicate the disease from the open range country where it had spread to a number of native cattle. As territory was cleaned and disinfected succeeding orders permitted each section to be advanced from closed to exposed area, from exposed to modified, from modified to restricted and eventually to free area. These advances were usually made at periods of 30 days each where no new cases of the disease developed.

The figures in the above table are compiled from statistics gathered in the field by the veterinarians engaged in the active work of foot-and-mouth disease eradication up to July 15, 1915. Every effort has been made to secure as accurate knowledge of the means by which infection was introduced into a herd as it was practicable to do, and while it is probable that some slight errors have been made, they would not materially alter the total results, as given above. It will be observed that the two most important factors in the spread of the infection were public stock yards and human beings. The transmission by the former method may be readily controlled by regulations, but the spread of infection by people offers many serious difficulties.

The notations "1," "2," and "3" are self-explanatory. Under item 4, however, should doubtless be added a number of cases charged under item 1. In a considerable number of cases, animals shipped from stock yards, apparently healthy when shipped and unloaded, but afterwards developing the disease, may have received the infection from the cars while en route, instead of at the stock yards from which they were shipped. As soon as the outbreak was discovered, however, the disinfection of stock cars was ordered, and it is not probable that many such cases happened after that date.

Under item 5, "From creameries," infection was chiefly carried to these creameries by milk from infected cows, and disseminated by the feeding of skim milk to other animals. It is evident that the number of such infections in Michigan is entirely too small since about one-half of the unknown sources of infection in that state, especially in Berrien County, have been closely connected with infected creameries, but they have not been so tabulated because the evidence was not sufficiently conclusive. As foot-and-mouth disease is not the only epizootic which is spread in this manner, need is shown for legislation requiring creameries to pasteurize any skim milk sent out for animal feeding.

Item 6, "Vaccination with infected virus" is explained elsewhere in this paper. A careful investigation was made by the Bureau of Animal Industry, resulting in the finding that all infections prior to August 8, 1915, was contained in the virus and not in the serum, with which the animals were vaccinated. A glance at this table shows the four states to which this virus was shipped.

Item 6, including (a), (b), and (c), presents one of the most interesting features of the entire outbreak. Out of a total of 3021 infected herds, 509 of the number were infected through virus carried upon the shoes, clothing or bodies of persons. Of the 604 "unknown" cases, it is probable that a considerable per cent of the infection was carried in this same way, making more than one out of every six cases infected as a result of this method of transmission. No stronger argument could be presented for the necessity of maintaining an armed guard on quarantined premises. Of the 41 cases, transmitted by practitioners and dairy inspectors, the larger part of the number occurred early in the outbreak, before knowledge of the outbreak existed. Although the most careful investigation has been made, no case has been found wherein the State or Federal inspectors engaged in the work of eradication have carried infection on their clothing or persons. This is due to the painstaking method of disinfection and fumigation enforced by the Department and the various states, and which is described in another part of this paper.

Under item 8, crows seem to have been the chief carriers, and careful study of their habits by a number of inspectors have brought out some interesting facts in this connection. In one instance at least, a band of crows have been followed by telephone and automobile for a distance of 35 miles. The habits of these birds in flying from place to place, alighting in cattle and hog yards, and running over the ground picking up small bits of manure or litter upon their feet, show how easily they may become carriers of such intensely infectious diseases.

Under item 10, no cases have been shown wherein infection was carried for any distance by streams, although infected litter has been carried to nearby pastures.

Item 11, "Infected feed or garbage," includes a number of cases where swine have been fed offal from slaughter-houses, later found to have been infected.

Under item 12, "Other known sources," is included twelve cases of reinfection on infected farms, after slaughter and disinfection.

While this percentage is very small, careful inquiry was made as to the probable cause of such reinfection. Printed reports covering the disinfection and restocking of these premises were requested of all inspectors in charge of reinfected premises. This investigation disclosed the fact that in each instance the work of disinfection was conducted on these premises during very cold weather, or at a time when snow and slush covered the infected ground. In this way, virus which had been tramped into the ground, or had lodged in concealed corners, was protected from the action of the disinfectants used. Later, as the weather grew warm, and the premises were restocked, this virus was uncovered and was the source of reinfection.

Among other known sources are included infection from railroads passing through or near farms, from which infected litter fell, the use of feed bags from infected premises, the employment of a common pasteurizing plant, use of milk utensils that had been on infected premises, etc.

Under item 13, "Unknown," 603 cases are placed. Of this number 206, or over one-third, are in the State of Michigan and Indiana, and are chiefly cases which became infected before the work of eradication was started. While about one-half of the latter are believed to be due to creamery infection, the remainder were probably carried in almost every known way, and if added to the number under the proper item would hardly change the ratio of the entire table. Many of the herds carried under this item in other states have doubtless become infected through the activities of persons in visiting other infected premises, but this could not be established by the inspectors. To this list, too, must be added the cases of infection carried many times by birds, rats and other small animals, of whose movements no records could be kept.

The susceptibility of swine to foot-and-mouth disease has been thoroughly demonstrated during the recent outbreak, and the tendency of these animals to have the disease in a mild and atypical form has resulted in numerous unpleasant complications and extensions of the disease.

The lesions of this disease in swine are not always readily discovered by the casual observer. Stomatitis, especially in the necrotic form, is a common sequence of hog cholera, while traumatism of the feet, especially contusions of the plantar cushion, are frequent in swine which have been driven or shipped. For these reasons little attention is paid by the owners of swine to these symptoms, and

unless the herd is located within suspicious territory of foot-and-mouth disease may continue in a chronic form for a considerable length of time before discovery. The danger of course lies in the ability of these animals to disseminate the disease.

This is the condition which existed at the beginning of the outbreak in Michigan, later permitting the infection of the Chicago and other stock yards, still later found to exist among large numbers of swine in the outskirts of Philadelphia, and which has again been responsible for a new outbreak after all territory was believed to be free from the disease.

On July 29, since the above table was prepared, foot-and-mouth disease was discovered to exist in a herd of 20 cattle within the city limits of Hornell, Steuben County, New York. As no known cases of the disease had previously been found within a radius of over 75 miles, the source of the infection remained a mystery until two days later, when 125 swine, divided among five herds, were found infected within a half mile of the first-discovered premises. These swine had evidently had the disease in a mild form for a considerable length of time as new horn on all four feet of many hogs had grown half-way down. Infection had been carried from these hogs to the cattle through drainage.

As no previous infection had been discovered on a farm since May 11, and in a slaughter house since June 16, the report came as an unpleasant surprise, but emphasizes again the need for continued careful supervision of all live stock in previously infected areas, especially large herds of swine.

Veterinarians should endeavor as far as possible to make occasional examinations of districts containing swine in any considerable numbers, in order to prevent if possible a repetition of these conditions.

On August 8 another herd containing 24 cattle and 3 hogs was found infected in Steuben County, 20 miles south of the infected farms above-mentioned. The owner of the former farm had motored to the vicinity of these farms 8 days before his cattle developed the disease, which is the only plausible explanation of the source of this infection. The milk from this herd was used by a cheese factory with 44 patrons, and farms of the latter have been located and are being systematically inspected. It will be quite remarkable if some of the herds of these patrons do not develop the disease from infected whey carried back to the farms for feeding purposes.

On the same date, August 8, foot-and-mouth disease was discovered among 119 hogs and 4 cattle at Wheeling, Cook County, Ill., 22 miles north of Chicago. No definite conclusions are warranted at this time but suspicion has been cast upon a batch of hog-cholera serum which had been prepared in Chicago last October at an establishment where the disease was not known to exist at any time. The serum was kept in cold storage, preserved in 0.5 % carbolic acid, and not used until after the quarantine restrictions had been removed following the negative test experiments on 10 hogs. This batch of serum was used in six Illinois counties and one county each in Indiana, Michigan, and Minnesota. The hogs in this Minnesota county and four of the Illinois counties developed the disease by August 11 and have been disposed of in the regular manner. The hogs in the Michigan county were appraised, slaughtered, and the premises disinfected before any of the disease developed in order to prevent the occurrence of new centers of infection. This procedure was also followed in the two remaining Illinois counties but the State officials of Indiana refused to adopt this recommendation with the result that the vaccinated hogs in Posey County, Indiana, developed the disease on August 16.

It is to be expected that a few scattering cases of foot-and-mouth disease will still be reported from time to time, but as long as even these sporadic and quickly controlled occurrences continue, the epizootic cannot be considered as entirely over. Carelessness may now undo the work of ten months and force the country to face once more the greatest danger that has ever threatened its live stock. By the immediate slaughter of all animals known to have been exposed to the infection, by the thorough disinfection of all premises and articles that might harbor the contagion, and by the imposition of Federal and State quarantines, the disease has been brought under control. These measures must be persisted in, however, until the last atom of infection has been destroyed beyond a doubt.

(To be continued)

LUPINOSIS OF HORSES AND THE TREATMENT*

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The word "lupine" is derived from the Latin word "Lupus" which means wolf. The French applied the word to a certain class of plants because of their tendency to impoverish the soil. Lupines, then, from the first uses of the word, are leguminous plants of the order *Lupinus*. Some species are cultivated as forage plants, the seeds of some are used, as pulse, for food, and several species are actively poisonous.

Lupines are herbs with palmately compound leaves, stipules adherent to the base of the petiole, flowers showy and in long dense racemes, calyx deeply toothed and two-lipped, corolla with an ovate standard, margins reflexed, wings oblong or obovate, lightly cohering and inclosing the keel which is incurved or beaked, stamens monadelphous, anthers of two-forms, pistil with an incurved style and sessile ovary, and pod flattened. There are about one hundred species in the temperate regions; and a few less in the warm regions.

Lupinosis is a disease often fatal and ascribed to poisoning by lupines or by the chickpea. It is a disease among sheep and horses especially, and is caused by eating the seeds and straw of the lupine. Cattle and goats are also susceptible and the dog has been poisoned experimentally. There are many species of the lupine growing in various parts of the United States, although the yellow lupine (*Lupinus luteus*) is supposed to be the most toxic. The nature of the toxic agent found in the lupines has not yet been determined. Arnold and Schneidemuhl succeeded in isolating a chemical poison and gave to it the name lupinotoxin. They described its physical properties but failed to determine its chemical composition. Attempts to associate a fungus with the plant have failed. Lupinosis is characterized by jaundice, acute yellow atrophy of the liver, and parenchymatous inflammation of other internal organs.

The disease appears in either the acute or chronic form. In the acute there is hurried and difficult breathing, rapid pulse, stupor, vertigo, and not infrequent swelling of the lips, ears or face. The initial temperature may be as high as 104° to 106° Fahr., but it is intermittent and gradually falls just before death. The pulse may reach 130 per minute and the respirations 100. A bloody

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froth may issue from the nostrils. Icterus which may be detected in the conjunctiva and the urine, usually appears on the second or third day. In certain cases this latter symptom fails to manifest itself and therefore is not constant. There is grinding of the teeth and sometimes trismus. The animal apparently prefers the recumbent position, extends the head on the ground and seems entirely oblivious to all surroundings. At first there is a constipation, the feces being hard and scanty and covered with yellow mucus. Later diarrhoea may set in and the excreta be tinged with blood giving it a dark brown color. Emaciation develops rapidly. In case of recovery the symptoms gradually abate and improvement takes place slowly. Cachexia is a common sequel. In the chronic form the symptoms are not so violent. Inflammatory tumefaction of the lips, eyelids, and ears with the formation of ulcers and scabs is described by various writers.

COURSE: Death may supervene within twenty-four hours to forty-eight hours, although frequently the disease lasts four or five days. The immediate cause of death is emaciation and extreme weakness.

LESIONS: The cadavers are emaciated and decompose rapidly. The muscles are of a grayish yellow color, the fibers having become fatty and having lost their striations. The subcutaneous tissue of the abdomen, and the omentum and mesentery are yellowish. The most important lesion in both the acute and chronic forms is found in the liver. The alterations in this organ are those of acute hepatitis. The liver cells have become swollen and granular on account of the parenchymatous change, or they may be more or less completely degenerated into fat. The gland is soft and friable and may be somewhat swollen. The interlobular connective tissue is greatly increased in amount due to inflammatory hyperplasia. In the course of a few days the liver undergoes acute yellow atrophy as a result of the absorption of the degenerated cells and the contraction of the hyperplastic stroma. In the chronic form the changes are those of chronic interstitial hepatitis. The icterus is of hepatic origin and due to catarrh of the bile ducts. In sheep, the gall bladder is distended with bile and its lining membrane is congested and swollen. The kidneys and bladder may show changes, more or less marked, due to inflammation. The bladder is, as a rule, empty. In the digestive tract we observe frequent yellowish discoloration of the mucosa, hemorrhages in the small intestine with catarrhal lesions of the entire canal. The heart is

pale and pliable and the blood which it contains is dark and thick. Capillary hemorrhages are quite generally observed throughout all of the tissues.

By the foregoing discussion, it is evident that the liver is the primary organ to become affected in lupinosis; and consequently there must follow a series of conditions and symptoms corresponding with the stage of degeneration of that organ. Just so much as the function of the liver is retarded, there will be a corresponding auto-intoxication of the entire system, with progressive degeneration of other organs in proportion to the diseased condition of the liver.

HISTORICAL: Isolated cases of lupinosis were seen about 1860 in northwestern Germany by Wienands, Liebscher, and Guttlich. The first observations of lupinosis taking an enzootic course date from 1872. They became more and more frequent till 1875. At that date, at the request of the Prussian Minister of Agriculture, researches were begun in the veterinary schools of Berlin and of Hanover, in order to determine the nature of the disease.

The regions where lupinosis made its first ravages were those whose soil is particularly favorable to the culture of the lupine in Prussia, Pomerania, and in the provinces of Posen and Brandenburg; later it reached Hanover, and finally all northern Germany. It is unknown in southern Germany.

The losses to agriculture in Germany caused by lupinosis were considerable. Often one-half to three-fourths of the flocks attacked died. In some districts of Pomerania its annual mortality amounted to several thousand sheep.

The first recorded study of lupine poisoning in America was that made by Chestnut and Wilcox while operating in Montana. There they found cases, in 1896, of poisoning in sheep both from grazing on the public range and from feeding on lupine hay during the following winter. They reported a number of cases where several hundred sheep died from acute lupine poisoning in Montana during the summers of 1898 and 1900. They also have on record a few cases of acute poisoning of horses on lupines. With the exception of the Germans, Wilcox and Chestnut are the only ones mentioned in available literature who have recognized lupine poisoning of horses and given complete reports of the symptoms and pathological lesions. All other text books appear to have drawn their information on this subject from the German texts.

The United States Government bulletins recognize the fre-

quency of lupine poisoning of sheep, and invariably add that horses, as well as cattle and goats, may be poisoned thereby; but that horses do not eat of lupines unless they are starved to it.

About the first of October of last year there were several horses on the farm of the Ranchland Company, at Gregson, Montana, that showed various degrees of illness. Mr. W. L. Irvine, Manager of the company requested that I make an investigation of the cause of their sickness. After looking over the farm, there was nothing to be considered for cause except lupines, of which there was an abundance in the plowed fields and in the pastures. The ranch consisted of three thousand acres of land, and there were some fifty-five horses and a few cattle kept there.



FIG. 1.

Twenty-five head of horses ran in a two-hundred acre field of summer fallow, which had an opening into a wild grass pasture, from July until October. Of these, a number were worked during the day and returned to the pasture nights. In addition to the "wild peas" there was considerable volunteer grain which, however, disappeared with the early frosts; but there remained an abundant growth of flowered and seeded lupines. The horses ate of the lupine plants freely and the owners supposed it to be good feed. The plants remained fresh and green in this plowed field until the first of November.

The specimens sent from the Gregson farm to professional botanists, including the division of the United States Department of

Agriculture on poisonous plants, were classified as *Lupinus argenteus argophyllus*, *Lupinus sericeus*, and *Lupinus flexuosus*.

On October 14th, 1914, we placed a horse in a box stall and began feeding him a full diet of lupines, gathered fresh each day. The lupines were not weighed, but fed *ad libitum*. The horse consumed from two to three burlap oat bags full each day until October 29th. This is the record: October 14th; experiment lupine horse, B. G., 10 yrs. old, 1400 lbs., ringbone right front, quiet and gentle, temperature 100, pulse 48, eyes clear and pupils normal. October 20th; temperature 100, pulse 36, pupils dilated and horse very nervous. When one entered the stall he would jump to the opposite side, throw up his head and snort and stand trembling when cautiously approached. The pupils remained dilated when exposed to an electric light. After several days the nervousness gradually subsided and was succeeded by stupor or sluggishness. As the lupines were becoming scarce by the effects of the freezing nights, it was decided to administer a decoction of the plants which was done on the 29th. The results of this showed temperature 99.4, pulse 36, respiration normal. About four gallons of infusion of the lupine was administered through a stomach tube at 1:00 P. M. At 2:00 P. M. there was extreme nervousness, trembling of the voluntary muscles, dilated pupils, temperature 101.6, pulse 34, respiration accelerated. At 5:00 P. M., temperature 102.5, pulse 76, rigors considerably subsided. On October 30th; temperature 103, pulse 90, hair staring, eyes dejected, purging with liquid feces, horse in stupor, lying most of the time but with occasional colicky pain and he refused to feed. November 1st; temperature 103, pulse 72. November 2nd; temperature 103.4, pulse 72. There is marked jaundice on the visible mucous membranes; the horse shows an anxious expression, carries head low, leads with difficulty, and has the appearance of a very sick animal. He was turned into the summer-fallow field where he died on November 9th.

I held a post mortem on this horse about two hours after death and found the following conditions: subcutaneous connective tissue, peritoneum and mesentery yellow; liver dense grayish yellow, friable and easily torn; weight 25 lbs.; kidneys weighed three and one half and four lbs.; they were very soft and friable. The heart was slightly enlarged, yellow and the muscles quite flabby. There was a quantity of purulent fluid in the chest cavity of this horse for which I am unable to positively account. It is possible that some of the decoction entered his lungs at the time of administration through

the stomach tube, but there was no evidence of it at the time,—such as coughing and difficult respiration with rales. It is very likely that the cold nights, to which he was exposed while refusing to feed, brought about this condition of empyema.

Specimens of the organs of this horse together with those of two other horses, were sent to the Kinsley laboratories at Kansas City, for examination. Dr. A. T. Kinsley gave the findings on this case as follows: "The microscopical examination of the liver shows marked atrophy, fatty changes and pigmentation and a slight lymphocytic invasion. The heart muscle shows cloudy swelling, the kidneys show inflammation and slight lymphocytic invasion; the serous membrane shows lymphocytic invasion in the subserosa."

On November 14th, I autopsied a gray mare on the Gregson farm, which was the first one having shown sickness in 1914. This animal had not completely shed from the previous year and had shown attacks of vertigo since August. The animal was cachectic when shown to me on October 1st, and continued to decline until she died on November 14th. The post mortem findings are as follows: the subcutaneous tissues showed dark yellow deposits, which also characterized certain other connective tissues; the liver gray and brown mottled, hard, tough and leathery, thickened in certain portions, and shrunken in others. The kidneys were hard, with capsules attached; heart enlarged, flabby, and containing a well organized thrombus in the right ventricle, which extended into the pulmonary artery. The stomach, duodenum and small intestines showed catarrhal inflammation. There were a few bots in the duodenum and great numbers of sclerostomes in the large bowels. There was thrombosis of the great mesenteric artery; but the lumen was not completely closed. The ovaries were enlarged.

Dr. Kinsley's report on microscopical examination: "Liver, marked fatty degeneration and a slight pigmentation; kidneys, marked atrophy and pigmentation; heart, marked pigmentation, which is indicative of inflammation; ovary, hyperemic corpus luteum."

On November 17th, 1914, I autopsied a black mare belonging to Sherman & Reed of Butte, Montana. The animal had been ill for a year, and was taken so while on a lupine pasture in the Big Hole Valley, some thirty miles south of the Gregson farm. Post mortem findings: liver unusually hard and leathery, irregularly thickened and shrunken, both kidneys enlarged, dense, and marked by parenchymatous degeneration; ovaries enlarged and hard.

Dr. Kinsley's report on microscopical examination: "Liver shows fatty degeneration, pigmentation and a marked lymphocytic invasion around the bile ducts; ovaries show oophoritis and lymphocytic invasion; kidneys show nephritis with lymphocytic invasion."

Seventeen horses had died on the Gregson farm by the first of April 1915 and I autopsied fifteen of them. The same character of lesions were found in all of these cases. However, some contained large numbers of sclerostomes in the large bowels and a number showed organized clots in the heart. One case, a gray mare six years old, which died on January 17th, had a small fibrinous clot the size of a hen's egg suspended to a pedicle a half inch in diameter and long enough to permit the thrombus to lodge in the aortic orifice. It was firmly attached to the chordæ tendineæ of the bicuspid valve. This animal showed frequent attacks of vertigo for several weeks before she died. There was a marked valvular insufficiency with a general cachexia reaching an extreme degree.

Of the horses affected on the Gregson farm, cachexia was a common characteristic, but some died in apparently good flesh with a rapidly formed heart thrombus. Valvular insufficiency was a common symptom. Upon the information gained from Dr. Kinsley's report, that lymphocytic invasion was a constant condition in the specimens of the three horses examined by him, I decided to make blood counts of the affected horses. During February I made counts on a number of the horses and found the red corpuscular count to run from seven to nine million per cubic millimeter and the white from twenty to thirty thousand. A number of the apparently healthy horses showed leukocytosis. On March 11th, I made blood smears of 37 horses on the Gregson farm, and Dr. Caroline McGill, pathologist at the Murray Hospital, Butte, Montana, made the differential blood count. We used the following percentages for the approximately normals and all horses that differed materially from these percentages were isolated as being probably diseased: Lymphocytes & large mononuc. 34%; neutrophils, polymorphs. 61%; eosins, 3.6%; mast. 0.2%.

By this count sixteen horses were shown to be more or less diseased. Nine showed it by clinical symptoms, five by certain degrees of cachexia and two by well marked valvular insufficiency. No. 15 gave the following differential percentages: Lympho. and large mononuc. 89%; neutroph. 61%; eosins 2%; mast. 0%. This animal died four days later and the post mortem showed: yellow tissues, liver, spleen and kidneys enlarged; heart enormously enlarged and

with a well organized clot in the right ventricle and pulmonary artery; gastro-intestinal catarrh, with an ulcer in the glandular portion of the stomach and one in the double colon.

No. 16, R. M. 15 yrs., 15½ hands, is a very interesting case and I will take just enough of your time to detail the course of study on this animal and use it to illustrate the results obtained on the other sick animals on this farm.

Because of the constant post mortem findings of liver degeneration followed by the degeneration of the other solid organs, it was

decided to try treatment on the fourteen horses as indicated by the leukocytosis on the Gregson farm and accordingly these animals were placed on the treatment of artificial Carlsbad salts. This treatment was used because of the action of the salts in increasing the normal functions of the liver, and also on account of the cheapness and the ease of administration. Each horse received two tablespoonfuls of the salts night and morning in a quart of oats. The treatment was begun on April 2nd and continued for four months with the result that the horses began to improve in general condition about the fourth week of the treatment, and in two and a half months were normal in physical condition as well as in proportion of blood corpuscles.

R. M. No. 16, at the beginning of the treatment in March, showed extreme cachexia, pale mucous membranes, and a marked valvular insufficiency. She was too weak and short of breath to go faster than a walk. She began to show improvement about the fourth week of the treatment and had gained so much by the middle of June that she was put to work and has done her work in the field ever since. (Fig. 2). Her blood counts were:

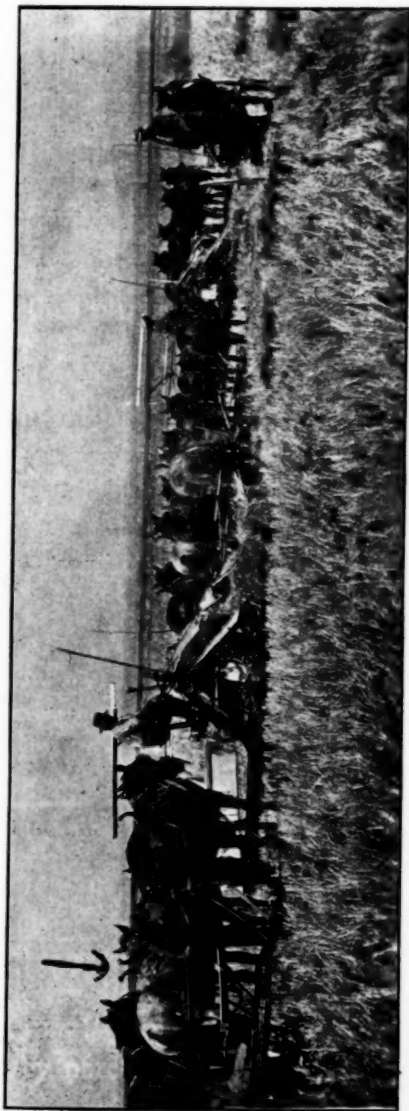


FIG. 2.

	Differentials:			
	Lympho. & L. Mono.	Neutro. & Poly.	Eosins	Mast.
Mar. 11	9%	89%	2%	
July 21	29%	69%	1.5%	.5%

White Corpuscles	
Mar. 28	20,300 per m.m.
May 10	14,700 per m.m.
July 21	9,700 per m.m.

The leukocytic counts were continued weekly on all of the fourteen horses except three, numbers 4, 8, and 9, which were removed to another farm fifty miles distant. Although these three had received good care and feed, they had received no medical treatment and were reported not to have improved in general condition. On May 10th I made the counts of the leukocytes and found an increase in two of the horses and a slight decrease in the other one; but these animals had not begun to shed and had made no gain in flesh. These three horses were then put on the treatment of artificial Carlsbad salts and have made satisfactory gains since.

On June 17th, 1915, I placed a horse in charge of Mr. Elden Roth, who lives four miles north of Missoula, for the purpose of testing the effects of lupines in this locality. The plants were gathered from the Crescent Dairy ranch and were classified by the Montana State Experiment Station as *Lupinus leucophyllus*. Only mature lupines were fed and the horse consumed approximately fifty pounds each day for the first week, after which he ate somewhat less. At the end of the three weeks, he was eating about twenty-five pounds per day and continued to take that amount until the end of the experiment. The horse was, at the beginning of the experiment, in good flesh, of a rich brown color and was apparently healthy. Following is the record of the experiment in feeding lupines: June 17th, Br. G., 15 yrs., 15½ hands, weight 1,000 lbs.

	Temp.	Pulse	Leucocytes	Red Corp.
June 17	101.2	48	17,800	9,000,000
July 1	99.6	38	21,500	8,600,000
July 13	98.4	30	22,000	7,500,000
July 30	99.5	32 (12:00 M.)		
July 30	98.4	42 (4:00 P. M.)		
July 31	97.4	26 (12:00 M.)		
July 31	98.5	48 (4:00 P. M.)		

On the seventh day of the experiment the horse appeared full. He was eating well but drank only about one gallon of water per day. The pupils were well dilated in the ordinary light of the stable, but contracted when exposed to bright sun-light. The feces were dry and passed in hard pellets. Mr. Roth said he noticed certain nervous movements when handling the horse and a quivering of the muscles could be felt under the hand.

On the tenth day there was a marked jaundice of the visible mucous membranes. The horse was refusing to drink water and the hair was erect.

On the fourteenth day the horse appeared to be a hundred pounds lighter in weight than he was the week before, hair staring and dry, membranes icteric, feces passed in pellets covered with

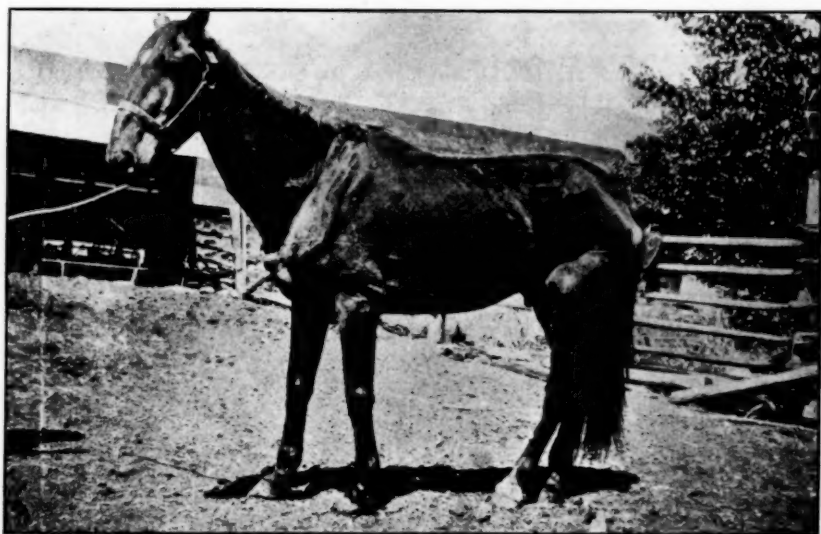


FIG. 3.

mucous, some edema of the lips, sheath, abdomen and limbs. The heart sounds, dull and the horse was stupid. He had not consumed more than three gallons of water for a week.

At the end of the third week of the experiment the horse was an object of pity, a typical case of cachexia. Fig. 3. The skin was peeling under the hair and there were rolls of scurf accumulated on either side of the dorsal region. The sphincter ani was relaxed and the hairless skin appeared to be shedding its epithelium. The horse appeared to be suffering from exhaustion, carried the head low, and

walked with an uncertain movement of limbs and body, ate of the lupines with fair relish, but evidently craved some other food as he began biting the trough. He still refused to drink more than a few swallows of water. He was drawn in the flanks and the ribs were prominent.

At the end of the fourth week, the horse seemed to be in about the same condition; the membranes were not quite as icteric and the senses seemed a little brighter; the cachexia was more pronounced.

During the last two weeks of the experiment the horse was given about half the normal feed of baled timothy hay mixed with fresh lupines. *"It is of special interest to note that he picked the lupine peas out from among the hay and ate them first."*

On June 30th I administered four gallons of a strong decoction made from freshly gathered mature lupines. The solution was given through a stomach tube at noon. There was very little change in the condition of the horse as a result of administering the lupine solutions, although he appeared weaker and more depleted the following day.

On August 4th I destroyed the horse by severing the left carotid artery and held a post mortem immediately after death. The subcutaneous tissues were intensely yellow; the thoracic and abdominal muscles anemic, pinkish in color, soft and flabby; the peritoneum and mesentery were yellow as saffron; the liver grayish yellow; spleen enlarged and firm; kidneys and heart normal, except there was a small fibrinous clot, about the size of a man's thumb, attached to the bicuspid valve. There was a well marked catarrhal inflammation of the stomach and small intestines with some hemorrhages showing in the intestines. There were a number of areas a half inch in diameter of denuded squamous epithelium along the cuticular ridge of the stomach. The brain showed congestion of the superficial vessels of the cerebrum and cerebellum.

The microscopical examination of the organs of this horse was made by Dr. Caroline McGill of the Murray Hospital, Butte, Montana, and the findings were as follows:

"Pathological Examination of Tissues from Br. G.

Experimental lupine horse:

SPLEEN:

Gross:—Hard, fibrotic, pigmented.

Microscopic:—Marked decrease in the number of lymphocytes.

Malpighian bodies much decreased in size; pulp slightly congested. Mild pigmentation of recticular cells. Capsule and trabeculae normal except for mild pigmentation.

LIVER:

Gross:—Light yellow, fatty, pigmented, hard.

Microscopic:—Lobules distinct. Rather marked round cell infiltration around the portal canals. Mild general pigmentation of liver cells. Marked pigmentation of cells just beneath the capsule, and in places at the periphery of the lobules. Mild cloudy swelling. At center of the lobules there is some fatty degeneration. Epithelium of bile ducts intact.

HEART:

Gross:—looks normal.

Microscopic:—Mild lymphocytic invasion about vessels, otherwise normal.

INTESTINE 1.

Gross:—Shows small nodule 3mm. in diameter just beneath the serosa.

Microscopic:—The epithelium of the mucosa is eroded. Most of the villi have sloughed. There are more lymphocytes than normal in the mucosa. Many of the cells of the glands of Lieberkühn are degenerated. Lymphocytic invasion of the submucosa. Many lymphocytes in the muscularis. The nodule noted in the gross beneath the serosa is a mass of lymphocytes.

INTESTINE 2.

Microscopic:—Some villi have not sloughed but all surface epithelium is gone. Less lymphocytic invasion than in number 1.

KIDNEYS:

Gross:—Except for mild pigmentation, are normal.

Microscopic:—Marked lymphocytic invasion, especially about the blood vessels. Cloudy swelling of the epithelial cells, especially those of the convoluted tubules. Some of the cells are slightly pigmented. Marked increase in fibrous tissue.

BRAIN:

Medulla:—Section seems entirely normal except for slight congestion.

Cerebellum:—Nerve cells normal. Mild congestion.

Cerebrum:—Normal except for slight congestion.

I have been unable to find any published records of chronic lupinosis of animals in America and the information disseminated by authorities is to the effect that sheep only are subject to the disease and then only when they are in a very hungry condition. Private correspondence with authorities relative to the poisoning of the horses on the Gregson farm, several months ago, brought the report that "horses do not eat lupines unless starved to it and are therefore not poisoned on the range." In a subsequent letter, the

same authority stated that "if the horses on the Gregson farm had eaten the lupines as freely as was stated and were showing the symptoms described, it was very likely that they were suffering from chronic cases of lupine poisoning."

The following is a copy of a letter sent out by the local District Forester's office to all sheep permittees in September, 1914:

To Sheep Permittees:

"I wish to call your attention to the following letter from Dr. C. Dwight Marsh, in charge of the poisonous plant experiment station maintained by the Forest Service in co-operation with the Bureau of Plant Industry at Greycliff, Montana.

"We have noticed that in ordinary years a large proportion of the lupine pods are aborted. This year on the ranges we have seen that there is an unusually large number of perfect pods. Inasmuch as stock poisoning results largely, if not entirely, from eating the pods and seeds, there is reason to believe that the lupine is more dangerous this year than in the average year. There has already been one heavy loss on the Absaroka from this cause. I think it would be well if you would warn your permittees, so far as you have opportunity, to see that their herds never have an opportunity to eat largely of lupine. Sheep should never be turned in a lupine patch when hungry, for then they are almost sure to fill up on it with disastrous results. Especial care should be taken when sheep are shipped from one point to another, and put on a strange range. It should always be remembered that it is the hungry, close herded sheep which are most likely to eat largely of poisonous plants."

My observation is that horses, as well as cattle, eat freely of lupines in all stages of its growth and that they eat it more freely after other forage has dried up. I have seen horses feeding on the tops of the mature lupines as though they relished the peas. Stockmen report that horses eat lupines on the range, and the general opinion among stockmen is that it is good feed for horses and cattle. Mr. Irvine reports seeing his suckling colts feeding on the lupines while following the work mares in the field.

Lupines grow abundantly in the grain and hay fields, in the tame pastures, on the public ranges throughout the Rocky Mountain region of Montana. The plants near Missoula, which has an altitude of 3223 feet, matured the last of May. The first mature plants on the Gregson farm, altitude 5102 feet, were observed this year the first week in August. Lupines thrive in the mountains at an altitude of 9000 feet but I do not know that the plants mature at that altitude.

It is well known that lupines are more poisonous in some years than in others and in some localities than in others. The local Forest Service has had reports of acute poisoning of sheep, supposed to have been caused by eating lupines, during the years of 1907, 1909, 1913, 1914 and 1915.

Information as to the character of horse losses in western Montana shows that the losses from diseases have been by cycles, which usually cover a year's time. These losses have invariably been among the range horses and have been in acute, sub-acute, or chronic form. The laymen have been accustomed to call the disease "Mountain Fever" and the professional men "Swamp Fever." The year 1912-13 was a period of severe horse losses in western Montana. One man near Wisdom, Montana, lost forty horses out of a hundred and twenty head; another man near Missoula, Montana, lost twenty-five out of sixty head. The Missoula man thought the trouble came from a certain pasture and has not used that pasture for horses since. There have been heavy losses of horses in this locality during the past year, and several animals, which I have seen, have been diagnosed as swamp fever, showing extreme cachexia, in which the count of the red corpuscles ranged from five to seven million per cmm., and the white from seventeen to twenty-two thousand per cmm. Some of these animals which were placed on the treatment of artificial Carlsbad salts a few weeks ago are making satisfactory improvement at this time. I wish to state that one of the commonest symptoms of these chronic cases is valvular insufficiency.

The symptoms and lesions of the two horses used for experimental feeding of lupines were similar throughout and in many particulars identical. The most pronounced clinical symptoms in both horses was cachexia, which reached an extreme degree. The laboratory diagnosis of both was alike, in that there was fatty degeneration of the liver with pigmentation and lymphocytic invasion of other organs and tissues. Other horses which I have seen and autopsied in Montana, have shown the same character of clinical symptoms and identical pathological lesions. It is therefore established that horses have been affected with chronic lupinosis and died from the effects of the disease. It is probable that horses are frequently affected with chronic lupinosis when they are supposed to be suffering from some other disease.

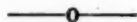
The fact has been established that horses have been poisoned in western Montana from the effects of eating lupines, that it pro-

duces a chronic inflammation of the liver and a progressive fatty degeneration of that organ, followed by a like degeneration of the other solid organs. Auto-intoxication, indicated by general cachexia, frequently accompanied by valvular insufficiency and attacks of vertigo usually resulting in complete prostration and death.

The success obtained by the use of the artificial Carlsbad salts in treating diseased horses on the Gregson farm has encouraged its use in trying the treatment on range horses. Several bunches are now being treated with full confidence that further losses among them from lupinosis will be prevented.

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ABSTRACT OF DISCUSSION.

DR. LYMAN: I notice that the first reading of temperature was a hundred and one and a fraction, then from there the temperature diminished to ninety-eight or thereabouts.

I think it is quite a general opinion that the temperature of horses varies in different parts of the country, and I would like to ask the Doctor, for my own information, what he considers the normal range of temperature of horses through that section of Montana. That might have some bearing upon the temperature that he recorded.

I think the Doctor brought out a very interesting feature, to me, at least, the fact that these animals do eat lupine at other times than when they are hungry.

It is a general opinion among a number of people that animals only forage upon that plant when they are hungry, but the Doctor has shown that they pick the pods off by preference.

DR. KNOWLES: The average temperature of horses runs from one hundred to one hundred and one in Montana, I think.

This horse had traveled twelve miles and had stood about four hours when these first records of mine were taken. But ordinarily the horse would be normal in that length of time if his temperature was at all elevated. I assume that the first temperature given was the normal.

I find many horses will run a normal temperature of one hundred and one, and from a hundred to a hundred and one is about the average normal in Montana, so far as my experience goes.

DR. TYLER: The Doctor, it seems to me, has disproven a number of facts which have gained permanency.

I take it, in speaking of the up-range as the disease progressed, and the cachexia becomes normal, the temperature is inclined to sag and then becomes normal. Whether that is due to the progressive cachexia and exhaustion, I do not know. I would like to hear it discussed by men living in the territory where the plant is plentiful.

The Doctor diagnoses this as "Swamp Fever", and it is a fact that his post-mortem findings co-incide with my observations along that line; but so far as I was aware, we had no lupine in that territory, although possibly I may have overlooked it, as I never made any particular search for it.

I would like to have the Doctor's personal opinion as to whether he considers that there might be a confusion of the two diseases, or whether they are one and the same.

DR. I. E. NEWSOM: As to all the seeds of lupine being poisonous, I would like to ask if that is the idea he has gained from such work as he has done on this subject?

DR. KNOWLES: I find in all of these cases,—the temperature became sub-normal in advanced cachexia or in well-developed cachectic cases.

In both of our experimental horses, the temperature went down and the pulse, apparently corresponding with the amount of intoxication that the horses sustained from the alkaloid of the plants.

That was one of the conditions studied in the sick animals in that locality in comparison with the horses that we used for test or experimental cases. Finding that the temperature and pulse and blood counts ranged correspondingly, according to the symptoms or stage of the disease, with "Swamp Fever", I would say that I, along with other practitioners of Montana, have been of the opinion that we have had "Swamp Fever" very commonly, great numbers of horses dying of "Swamp Fever" in different years. The conditions or the symptoms were the same as I have described, and I am of the opinion that we had this condition instead of having "Swamp Fever". We have had a number of horses in my own and other veterinarians' practice,—cases where other veterinarians tried treating their horses in the same way that I have indicated, and from what we know of "Swamp Fever" this does not correspond; and it was almost conclusive proof that they did not have "Swamp Fever". Some practitioners have, during the past few years, had some horses recover from what they believed to be "Swamp Fever".

Therefore, from these experiences, and inasmuch as the lupine plants are so abundant all over the mountainous regions of Mon-

tana, it is more likely that our horses have been getting these poisons during the period when the plants were thrifty, and that they have not shown the symptoms for some weeks or even months afterwards, when the liver had become so badly diseased that it had lost its function and the horse began to break down on that account.

As to the relative poisonous qualities of the pods or seeds and the other parts of the plant, our experience did not take into account. We did not feed anything except what had the seeds on them; we fed the whole plant. I had considerable correspondence with the Department of Plant Industry this year, and they maintain that they are now making a study, chemically, of the lupine plant, but are not yet prepared to give out any information along those lines.

DR. H. JENSEN: I am not very familiar with the lupine, but if this plant should produce a condition similar to "Swamp Fever", and then the animal should recover under the treatment of artificial Carlsbad salt, it would rather lead me to believe there was nothing in common.

The lupine must be a slow poison, because otherwise the animals would be carried away before the ordinary Carlsbad salts would be of any value.

I am bringing out these points as rather inconsistent with what is known of "Swamp Fever".

DR. CAMPBELL: Does "Swamp Fever" occur in the highlands of Colorado?

DR. I. E. NEWSOM: Yes, it is quite prevalent, and at an altitude of eight thousand feet and there is lupine there. However, I do not believe it was the intention of Dr. Knowles to give us the impression that Swamp Fever is, in fact, lupinosis. I think it is a separate disease, but some cases of Swamp Fever have been mistaken for lupinosis and vice-versa.

DR. KNOWLES: I do not mean to convey the impression that lupine or lupinosis and "Swamp Fever" are the same things. They certainly have no connection, and as for the lupinosis, it seems to be amenable to treatment, whereas "Swamp Fever" is not.

The object of the treatment of these animals, as stated in my paper, was to increase the normal functions of the liver. I do not think that the treatment used, as we have used it, would be considered an antidote for the alkaloid contained in the plant, because the animals were sick several months after they had the opportunity to eat the lupine, and they were being treated in order to increase the normal functions of the liver, in view of clearing up the cachectic condition.

Any alkaloid, fungus, or whatever it may be that will cause a lessening of the normal functions of the liver, will produce a cachexia, and if the liver is so retarded that the ferments and the antitoxic function, the lack of secretion of the bile, and its other

functions are held up, it leaves the animal to suffer from an auto-intoxication; also from an intoxication that goes into the system from the intestines, which would ordinarily be taken care of by the liver if it were in full action.

It was upon that basis that I conceived the idea of trying to treat these horses by a simple, cheap, and easily administered remedy that might become practicable and largely useful.

DR. CAMPBELL: I am sure we all feel that Dr. Knowles should be commended for accomplishing such original research work while in active practice. It is rather an unusual condition, I think. Likewise, he is to be commended (and I think this is the part where the practitioner—and the practical point comes in) for offering an applicable remedy.

Too often, it seems to us who are in practice that scientific men, in their research, work out the cause of something and offer us a treatment to avoid the cause. In nothing do we see this more frequently than in forage poisoning, which they say is due to feeding the animal a certain sort of forage, and then the remedy is to feed something else. That is proper in the city where everyone buys the forage, but in Illinois, where the poisonous forage—the kind that produces the disastrous results—grows on the lowlands—the man has only to sell that to the Chicago men and buy something else from them.

I might refer to parts of Southern Oklahoma, where all the forages are the same kind. You might as well tell a man to lead his horse out and shoot him as to send North for his feed. He cannot do it, and he would rather run the risk of loss.

The remedy suggested is very simple and much the same as I have seen used many times after eating mouldy forage, with about the same results.

I have seen Glauber's and Epsom salts used. Of course I do not mean to offer that as a remedy where the forage can be changed. There are localities where it cannot, and a medicinal remedy is desirable for the general practitioner.

THE CAUSE AND OCCURRENCE OF CONTAGIOUS ABORTION IN CATTLE*

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Contagious or Infectious Abortion Disease in Cattle, is the latest among the serious, destructive plagues of food animals to receive the wide recognition in this country its great economic importance merits. In Europe, probably because it has existed there longer and is of much commoner occurrence, the importance of the disease was recognized earlier than here. Its infectious character was suspected as early as the 18th century though not conclusively proved until the last quarter of the 19th, and its specific cause, the abortion bacillus of Bang, was not discovered and described until the year 1897.

How young our knowledge of the real character of abortion disease in cattle as it occurs in America is, and how slowly we recognize the identity of the disease in America and Europe and awakened to an adequate appreciation of its grave, economic importance, may be gathered from facts like the following:

In the year 1908, or only seven years ago, one of America's foremost authorities on veterinary pathology and bacteriology, in a text book on the pathology of infectious diseases of animals, stated, regarding the specific cause of infectious abortion disease, that "The investigations in the United States have failed to reveal the presence of Bang's organism, but instead a variety of *B. coli communis* has been found by Chester and by Law and Moore." (1)

In another text book on the infectious diseases of animals, published in 1912, or only three years ago, by one of the best known authorities and writers on veterinary subjects in America, the identity of abortion disease in this country and Europe is questioned, and the possibility suggested and discussed that each continent may have a distinct type of infectious abortion disease peculiar to itself. (2)

These statements, which show what prospective veterinarians were being taught about the etiology of abortion disease in our vet-

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erinary schools only a few years ago, are remarkable now mainly because of their evidential value to prove how young our knowledge of the true character of infectious abortion disease is, and they will not be charged too heavily against their authors by those who know that only five years have passed since the first account was published of the isolation in America of the real abortion bacillus of cattle, (3) the bacillus of infectious abortion of Bang, and that this event did not at once prove the identity of abortion disease in America and Europe, but at first only that European abortion disease of cattle had invaded America.

Among the infectious diseases of food animals, the importance of abortion disease in cattle is ranked today by many authorities as second only to that of tuberculosis, with the lamentable possibility in view, if its spread is not checked, that it may soon force tuberculosis into the second place. And yet, our appreciation of the magnitude of the evil is so recent, even among veterinarians, that a search of the Proceedings of the American Veterinary Medical Association for the years 1908, 1909 and 1910, reveals only one, purely incidental reference to it. Fortunately for the welfare of our livestock industry the Proceedings of the Veterinary Association for the years 1911, 1912 and 1913 prove that American veterinarians are giving abortion disease an increased, and an increasing, amount of attention.

The data I have available do not show when abortion disease was first imported from Europe into the United States, but this occurred many years ago, long before anyone in either this or any other country possessed the necessary knowledge to devise effective measures against its importation.

Statistics regarding animal diseases in America are too meager to prove anything. Reliable, comprehensive statistics, had they been available, would no doubt have called attention with sharp emphasis to the rapidly increasing frequency of abortion disease in the United States a score or more of years ago, and would have given the investigations now in progress an earlier start. They certainly would have aroused a wide interest which, we may assume, would have prevented the passage of more than 13 years between the discovery of the abortion bacillus in Europe and the final determination in America that abortion disease of cattle in Europe and America are identical.

Although it was not known that the bacillus of infectious abor-

tion in cattle is of common occurrence in the milk of infected cows until the year 1912, in which a bacillus, pathogenic for guinea pigs, previously discovered in and isolated from milk by Cotton and myself, was definitely identified by Mohler, Traum, Cotton and myself as the bacillus of infectious abortion of cattle, I believe the milk-injection tests with guinea pigs made in the Bureau of Animal Industry at different times during the last twenty years by Cotton, Brett and myself throw at least some light on the rapidity with which abortion disease increased among the dairy cows from which the District of Columbia draws its milk supply. In the year 1894, samples of milk from 19 different dairies were injected into guinea pigs. The samples from one dairy caused lesions which were very puzzling at that time, but which, owing to the precise description we have of their character, are now known to have been the lesions caused in guinea pigs by the bacillus of infectious abortion of cattle. In the year 1907, guinea pigs injected with 36 samples of milk from 32 different dairies proved that $12\frac{1}{2}$ per cent of the samples were infected with abortion bacilli, and that $15\frac{5}{8}$ per cent of the dairies were responsible for the infected milk. In the year 1912, guinea pigs injected with 77 samples of milk from 40 different dairies proved that 30 per cent of the samples were infected with abortion bacilli and that $37\frac{1}{2}$ per cent of the dairies were responsible for the infected milk.

If we take the frequency of abortion disease as it is indicated by these tests to be equal to one in the year 1894, we see that one has grown to three in the year 1907, or 13 years later, and to seven in the year 1912, or after the passage of another 5 years, or from one to seven in the course of 18 years. At the present time I can say that repeated tests with guinea pigs of the milk distributed raw or unpasteurized in the District of Columbia by almost any large dairy which draws its supply from a number of different farms, sooner or later show that it is from time to time infected with abortion bacilli.

I would like to have it clearly understood, however, that I have not given these figures because I look upon them as reliable evidence to prove exactly how much abortion disease has multiplied in a given number of years in the United States or any portion of the United States. The figures are adequate data only, together with the gradually increased frequency with which abortion dis-

ease in cattle has been reported from year to year, to show that the growth of the evil is actual and not imaginary, and that some very real measures are imperatively required to check it.

Now, having given this much attention to the occurrence and increasing frequency of contagious abortion disease in cattle in America, I will try to devote the remainder of my time to its cause.

The bacillus of infectious abortion in cattle, the abortion bacillus of Bang, is a short, non-motile, at times almost coccus-like rod. There are peculiarities about its growth on artificial media under laboratory conditions, its reaction with various stains, etc., to which I will give no special attention, because those who are interested in the subject will have little trouble to find elaborate and detailed published accounts.

In many respects the bacillus is a very remarkable organism. In cows as we know, it causes abortions, but it does not seem able to maintain itself anywhere in their bodies but their udders and pregnant uteri. In the udder of a cow it may persist for years and contaminate her milk without affecting her health in any determinable way. In guinea pigs it is less commonly an agent which induces abortions, but is a cause of vast, destructive changes in their livers, spleens, kidneys, testicles, bones, etc. (4) In rabbits it is claimed to cause abortions and is capable of maintaining itself in their bodies for long periods of time without causing macroscopic lesions. It is capable of living weeks and months in the bodies of such widely different species of animals as monkeys, pigeons, rabbits, rats, mice, guinea pigs and cattle, (5) and in the bodies of children it causes bio-chemic changes which can be detected by agglutination and complement fixation tests. (6) Whether the bacillus is economically important as a cause of abortions among other species of animals than cattle, I am unable to say but inclined to doubt.

Among the various special tests for abortion disease two have proved satisfactory, the complement fixation and the agglutination tests. The former is too complex for general use and the latter relatively simple and equally reliable. These tests do not prove that a cow has aborted or is going to abort; they simply prove that a cow is infected or is not infected with abortion bacilli.

The abortion disease investigations which are being made at the Experiment Station of the Bureau of Animal Industry by Dr. W. E. Cotton and myself have proved, among other things, that

some cows which have never aborted and which do not subsequently abort may expel abortion bacilli from their bodies with their milk, and that all cows which expel abortion bacilli with their milk react positively with the agglutination test, and that the agglutinating substance is present both in the blood and the milk of such cows. This is strong evidence to prove that a cow which has never aborted and seems to be absolutely healthy in every respect may be the cause through which abortion disease is unconsciously transported from one locality to another, or from an infected herd, either directly or indirectly, into a previously uninfected herd. It suggests strongly that the owners of herds of cows which have not been invaded by abortion disease should permit no new cows to enter their herds until an agglutination test has proved them free from infection.

But the mistake must not be made to rely on the agglutination test in selecting bulls. At the Experiment Station we have tested a number of bulls which had been used for varying periods of time to serve infected cows, and only two of these bulls reacted positively, and they were two which Cotton and I had given subcutaneous injections of abortion bacilli suspended in normal salt solution. It seems that abortion bacilli rarely get into the bodies of male cattle in a way that causes modifications which can be detected by any means we have at our command, but nevertheless bulls may play a very important part in the transference of abortion bacilli from cow to cow. It is easily conceivable that abortion bacilli may be deposited on the male organ of copulation, and when this is retracted into its sheath, find an environment in which they can multiply, strictly exterior to the body, and remain alive and virulent indefinitely. How important this mechanical part the bull may play in the dissemination of abortion disease is may be judged from the following observations made by Cotton and myself in studying three questions, namely, the persistence of abortion bacilli in the uteri and vaginæ of cows after abortions; the possible appearance of abortion bacilli in the uteri and vaginæ of infected cows during periods of œstrum, and the possible recrudescence of abortion bacilli in the uteri and placenta of cows at normal parturitions subsequent to abortions.

We found that the infected condition of the uterus and vagina of a cow after an abortion may persist as long as 7 to 8 weeks. This is in close harmony with the observations of McFadyean and Stock-

man, who established a period of about 30 days. Our tests, which are as yet far from complete, have failed thus far to show a reappearance of abortion bacilli in the uteri and vaginae of infected cows at periods of œstrum, but, concerning the recrudescence of abortion bacilli in the uteri, vaginae and placenta of cows at seemingly normal parturitions which follow abortions, of 13 tests so far made 6 were positive. We also found that this recrudescence of abortion bacilli is not limited to normal parturitions immediately subsequent to abortions; our records show that it may occur as late as the third normal parturition following an abortion.

We may well ask, what chance, under these conditions, has the bull who is used to serve infected cows to escape becoming, himself infected but unaffected, a mechanical agent for the dissemination of abortion disease? And this should be taken, with good reason, as a sound argument against neighborhood bulls, and against the use of bulls in uninfected herds to serve a miscellaneous lot of cows that do not belong to his herd.

It is not difficult to see when we review the known facts about infectious abortion disease of cattle and the remarkable bacillus which is its primary, essential cause, why the disease has become widespread and strongly established in the United States. The fact alone that a large proportion of the cows which are attacked by the disease become and indefinitely remain carriers of its specific bacillus, a bacillus which is pathogenic in different ways for widely different species of animals, brings with it problems not easily solved.

Our methods of buying and selling cattle; our insufficient appreciation and use of modern tests to guard our herds against contamination through the introduction into them of seemingly healthy carriers of disease germs; our methods of permitting contact between animals at stock shows without first proving them free from contagious diseases, etc., together with other evils urgently need reforming.

I do not like to leave this subject without saying a few words in conclusion about the significance of the bacillus of infectious abortion as a parasitic organism which may attack human health. No proved disease germ is of commoner occurrence in cow's milk, and though no one has determined that it is truly pathogenic for human bodies, I do not believe that human health should be exposed to it. I believed at one time that it might be responsible in children

for adenoid proliferations and tonsillar troubles, because of the peculiar character of some lesions it causes in experiment animals, but Cotton and I on the one hand and Mohler and Traum on the other, were unable to prove this to be the case by testing a large number of diseased tonsils and many samples of adenoid tissue removed from the throats and noses of children by local surgeons and kindly presented to us, although Mohler and Traum found that the diseased tonsil of one child in their series of cases was infected with abortion bacilli.

Two years ago I presented a paper to the American Veterinary Medical Association on the relation of the abortion bacillus to the production of pure milk, from which I wish to quote one paragraph, as I believe it states concisely how we should regard the preventable exposure of human health to bacteria generally, irrespective of their occurrence in milk or other articles of food or elsewhere.

The paragraph is as follows:

We may say, relative to the bacteria against which human health should be guarded, that it is questionable whether exposure to a bacterium pathogenic for any species of mammals can be practised with impunity; that it is dangerous to permit exposure to any bacterium that is pathogenic for several species of mammals, though it may be, so far as we are informed, harmless for human beings, and that it is a deliberate invitation to disease to permit exposure to a bacterium, like the abortion bacillus, which is pathogenic for widely different species of mammals and is known to cause changes in human bodies that can be detected by complement fixation, agglutination or other biochemic tests or tests of any kind.

It is only necessary to add that pasteurization, which we need to protect our health against a variety of thoroughly proved milk-born evils, kills abortion bacilli in milk.

- (1) MOORE, *The Pathology of Infectious Diseases*, Third Edition. Revised and Enlarged, 1908, p. 525.
- (2) LAW, *Veterinary Medicine*, Third Edition, 1912, Vol. IV, pages 473 to 477.
- (3) MACNEAL & KERR, *Journal Infectious Diseases*, Vol. 7, 1910.
- (4) SCHROEDER & COTTON, *B. A. I.*, Circular No. 216.
- (5) FAYBAN, *Journal Med. Research*, Vol. XXXVIII, No. 1.
- (6) SEDGWICK & LARSON, *Amer. Jour. Dis. Children*, Vol. 10, No. 3.

THE BRITISH ARMY VETERINARY SERVICE

N. S. MAYO, Chicago, Ill.

In the August number of the Nineteenth Century Magazine, under the title "Cinderella of the Service" there is an excellent article by E. G. Fairholme on the work of the British Army Veterinary Corps during the present great war.

This article makes unusually interesting reading to an American for in giving a brief review of the British Army Veterinary Service it brings home to us the glaring, almost criminal, inadequacy of the present United States army in this particular.

In considering the question of transportation on the western front of the great war, it must be remembered that conditions there are unusually favorable for mechanical transport as the country roads are probably as fine as in any other region of the world. Yet, the author says, "Horses cannot be superseded. Mechanical haulage, though it has done much to relieve the draught horse in modern warfare, has by no means superseded him. Cavalry and artillery horses are still absolutely essential wherever ploughed land, ditches or hedges have to be traversed. Here the motor-cars, motorcycles and armored trains are helpless. One million horses, it is estimated, are now in use throughout the regions that are the scenes of the present gigantic conflict."

The article is too long to be reproduced here but the following quotations are presented:

After visiting eleven special centers of veterinary activity he says, "The Army Veterinary Corps with its wonderful organization is doing a stupendous, humane and economic work in the merciful destruction of horses badly wounded and the restoration of thousands of others fit to carry on the work. It is a magnificent work humanely and economically because every horse saved means another weapon for the fight," and "the work is done by men who are not only horse doctors but horse lovers," and he also expresses "immense admiration for the organization of the corps and the ability, energy and humanity of its members."

An interesting sidelight of the trying conditions is shown when he says, "During the whole of last winter it was one continuous fight against rain with its consequent mud and attendant ills" for at one time the region of the veterinary hospitals was a "sea of mud."

The sick, wounded and debilitated horses are brought back to the hospitals from the "railhead" in batches of about two hundred and fifty, being sent back in cars that carry ammunition and supplies to the lines.

"The death rate (among the horses) was exceedingly small and constantly decreasing. Even when face to face with the stupendous difficulties of the early part of the campaign the work done by the Army Veterinary Corps was amazing."

"There was a spirit of cheerful compliance that made one feel that, so far as horses went, all was well in hand." This is high praise for one qualified to judge. The *London Daily Mail* also says, "The Veterinary Corps have saved their thousands by medical skill and organization." And the Earl of Lonsdale, well-known sportsman and horse lover, also says in the *London Daily Telegraph*, in writing of "the remarkable and to me extraordinary Army Veterinary Corps organization:" "I do not believe in all the various departments of the army that there is any that show more astonishing foresight in the preparation, alleviation and general superintendence of the animal than do the Army Veterinary Corps and Remount Department."

All through the article great stress is laid upon the importance of a thorough organization. The day of isolated individual effort, no matter how well intended, is passed, at least in modern military plants. *An organization must be prepared at least in skeletal form to successfully deal with the problems of modern warfare.* The same author goes on to point out that the present British Army Veterinary Organization is only twelve years old, being forced upon the army by the sad experiences of the war in South Africa when the Boers would gather up the abandoned British horses and by careful nursing and treatment would soon use them against the British. The British War Department was at that time "economizing" as we have been doing in the United States. The Indian army, however, being independent had organized an efficient veterinary service and was able at the outbreak of the South African war "to supply veterinary stores and three fully equipped veterinary hospitals, each of which was capable of sub-division into two complete self-contained establishments."

After the establishment of an organized veterinary hospital service sixty per cent of the horses were returned to service. This number of trained army horses is much more valuable than the same number of fresh green animals.

The need of a thorough veterinary organization in the British army had been presented to the army authorities in 1887 by Major D. B. Brown, who says in a war office publication: "Depots for sick animals must be formed on the line of communication at frequent intervals, each being in charge of a veterinary surgeon with a suitable number of farriers and attendants under him. These depots must keep pace with the formation and expansion of the transport and should not be an afterthought called into existence only when the number of sick animals has increased to a large figure.

These should be of two kinds, large and small, the latter are pushed up close to the army and take charge of all fresh cases. Animals whose recovery depends upon time, and cases of debility requiring nourishment such as small depots are unable to furnish, are passed to larger depots in the rear. In the Abyssinian campaign these depots were formed at intervals of seventy-five miles."

In closing the interesting article, Mr. Fairholme says:

"When without any undue and insular partiality we contrast our own splendid veterinary service with the corresponding organization of other armies and learn that at every point the British system has established a marked superiority, we may well congratulate our army veterinary authorities on their thoroughness and foresight."

Now that the American people are waking up to the military unpreparedness of the United States, we must do our duty and exert every effort to have our United States Army Veterinary Service organized so that when a crisis does occur the indispensable animal transport will be humanely, economically and efficiently provided for. The present system, if one can so dignify the condition of isolated independent veterinarians attached to various units, is totally inadequate and doomed to disaster as the British demonstrated in South Africa. It is just as necessary to have a system and organizations for the successful care and handling of sick and wounded animals as it is for the sick and injured troops. It is our duty as citizens and as veterinarians to see that this is provided for in the new plans for efficient national defense.

HEXAMETHYLENAMIN, ITS ACTION AND USE AS APPLIED TO VETERINARY PRACTICE

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Hexamethylenamin is sold under various trade names; as for instance, urotropin, urotone, formin, aminoform, hexamin, cystamin, cystogen, etc. It is produced by the action of ammonia on formaldehyde and occurs as colorless crystals which are without odor. In watery solutions it gives a slightly alkaline reaction. It is very soluble in water, less than two parts, and quite soluble in alcohol, about ten parts. Hexamethylenamin occurred as a chemical long before it was used by Prof. Nicolaier of Berlin in 1894 and 1895, when he was chief of the medical clinic of the University of Göttingen. It was first used as an antiseptic in kidney and bladder infections, later to destroy typhoid bacteria in the urine, and still later it was found to be of value in phosphaturia. It was first thought that it would act as a solvent of uric acid calculi, but this was soon disproved. This drug has no local action, and therefore is not used externally. When taken into the stomach it is absorbed rapidly and its elimination through the kidneys begins rapidly. It has no effect on the circulatory and nervous systems, and does not seem to cause general poisoning. It has not been shown that it has very strong action as an intestinal antiseptic, except that some of it may be excreted after absorption into the colon. Just what becomes of the whole of the hexamethylenamin in the body has not been determined, it is known to be largely excreted in the urine, and has been found in the blood, in the gall bladder, in the pancreatic juice, in the serous fluids of the cerebrospinal axis, and in the different serous membranes, and synovial fluids of the joints. The excretion into the urine begins quickly but if several doses are given, it may not be fully excreted for several days. The drug may be found in the urine in less than thirty minutes after giving, and it is stated that its presence in the cerebrospinal and synovial fluids can be determined in less than one hour. The drug is not cumulative and can be given over a long period of time without harmful effects. When administered hypodermically the drug has a tendency to cause necrosis at the point of injection. It is not considered advisable to administer it in this manner. The drug is non-toxic in ordinary dosage, and unless a vary large dose were

given toxic symptoms would not occur. The symptoms from an excessive dose in the human subject are gastric irritation, diarrhoea, abdominal pain, kidney congestion, and most likely an excessive irritation of the bladder with some hematuria.

THERAPEUTIC INDICATIONS. Hexamethylenamin has a wide range of therapeutic indications. Its value as an urinary antiseptic is unquestioned. It has been held that the drug should be administered with an acid when given to equines. In practice this has not been found necessary. It is one among a very few drugs which appears to have any laxative effect in forage poisoning of horses. Given in two to three drachm doses in connection with *F. E. Passiflora incarnata* one or two ounces it will prove of value in a large percentage of cases. We administer the above dosage to an average sized horse every three to four hours. It will undoubtedly prevent the above malady when given in one or two drachm doses twice daily. In pyemic arthritis of foals the drug has proven of worth, in fact it has given far better results than any other treatment we have employed. In open joints, it will prove good treatment, and in mammitis of cows it is an extremely useful drug. Influenza bronchitis, nasal catarrh, and distemper have all been benefitted by its use. Dr. Steffen states in "Special Veterinary Therapy," (a most valuable little volume), that he has found the drug quite useful in allaying inflammation in protracted or prolonged colics. He combines the hexamethylenamin with belladonna, capsicum, and passiflora. Hexamethylenamin is a drug that should receive more careful study as to its actions and indications in veterinary practice.

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THE ACTION OF A COAL TAR DISINFECTANT ON HOG CHOLERA VIRUS

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A few months ago a series of experiments were instituted for the purpose of determining the germicidal activity of Kreso on the virus of hog cholera. In collecting data of this nature, several important conditions must be fulfilled, particularly those involving proper control on the experiments. The virus used in the tests must be sufficiently virulent to cause the death of pigs within approximately fifteen days from the date of inoculation, and typical

symptoms and lesions of hog cholera must be present in control animals. Another important factor is the elimination of naturally immune hogs from the series of experiments.

The details of this series of experiments consisted in the careful selection of highly virulent virus (serum from hogs infected with hog cholera of acute type) and the addition of a coal tar disinfectant, Kreso, in various dilutions to this virus. The Kreso solution was allowed to remain in contact (in vitro) with the virus for exactly 5 minutes after which the mixture was injected intramuscularly into healthy pigs. Control pigs received the same dosage of the virus and were cared for under exactly the same conditions as the test animals. The following table compiled from our laboratory data illustrates the nature of these experiments:

No. Hog	Character of Test	Material Inoculated	Incubation Period	Type of Disease	Date of Death. Duration of Disease from time of exposure.	Character of Lesions
76	Control	2 Ce. Virus (73) 3-5-15	6 Days	Chronic	Recovered in 5 wks.	
141	Control	2 Ce. Virus (161) 8-28-15	3 Days	Acute	9-16-15 19 days	Typical
154	Control	Ce. Virus (161) 8-28-15	3 Days	Acute	9-11-15 14 days	Typical
163	1% Kreso Solution	2 Ce. Virus (155) Exposed 5 min. 1% Kreso 8-26-15	6 Days	Sub-acute	9-17-15 22 days	Typical
75	1% Kreso Solution	2 Ce. Virus (73) Exposed 5 min. 1% Kreso 3-5-15	10 Days	Acute	3-23-15 17 days	Typical
164	1% Kreso Solution	2 Ce. Virus (155) Exposed 5 min. 1% Kreso 8-26-15	5 Days	Sub-acute	9-17-15 22 days	Typical
165	2% Kreso Solution	2 Ce. Virus (161)* Exposed 5 min. 2% Kreso 9-1-15	No Symptoms—Released after 20 days			
166	2% Kreso Solution	2 Ce. Virus (161)* Exposed 5 min. 2% Kreso 9-1-15	No Symptoms—Released after 20 days			

* See data above under Hogs No. 141 and 154 which were inoculated with same material as No. 165 and No. 166, except virus was not exposed to action of 2% Kreso Solution. Hogs No. 141 and 154 served as controls on No. 165 and 166.

The results of these experiments show that highly virulent hog cholera virus (in the form of serum from cholera infected hogs), exposed for five minutes to the action of a two per cent solution of Kreso, is rendered inert.

CELLULAR EXTRACTS AND THEIR IMPORTANCE AS THERAPEUTIC AGENTS

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Extracts of tissue are known under the various synonyms of cellular extracts, tissue extracts and physiological extracts.

The development of this class of therapeutic agents during the past several years and the results obtained from their use in various conditions commonly encountered in veterinary practice gives to them an exalted position; one equal if not superior to the position occupied by biological products, including vaccines, serums and bacterins.

Many conditions that a few years ago were considered incurable or fatal, now respond favorably to one or the other of the cellular extracts, either administered alone or as an adjuvant to the regular old line treatment or in conjunction with one of the biological agents. The importance of this class of therapeutic agents is now too well established to be overlooked or ignored.

In the list of cellular extracts may be included pituitary extract, corpus luteum extract, adrenalin, thymus extract, thyroid extract, leucocytic extract, lymph gland extract, and perhaps a few others. The action of each is specific, although the veterinary profession is confronted with such a mass of literature along these lines, that a deal of reading and careful judgment is required to understand and select the cellular extract required for each condition.

It is with particular regard to the two latter extracts that this paper is written, namely leucocytic extract (Archibald) and lymph gland extract (Archibald). These extracts regulate and stimulate some of the body's most important physiologic functions; those which constitute the protective and defensive measures against disease and which are most active in inducing convalescence by their action in stimulating the leucocyte producing organs to a more active function.

It may be stated as a general principle, the correctness of which is recognized by the entire scientific world, that any therapeutic agent that will stimulate and increase the number of leucocytes constitutes rational treatment in all infections and toxemias and that this is a condition to be very much desired, as it is along the

lines of nature's own methods of controlling or eradicating disease. It is certainly a well established fact that in the treatment of these diseases any method which will stimulate the leucocyte producing organs to a more active function, thereby producing an increase in the number of leucocytes, is, and must of necessity be, of positive value.

The great problem which heretofore has confronted the veterinary profession is to determine how to produce this physiological effect by the simplest and most innocent means possible. Many vegetable protein substances have been used to bring about these physiological changes, but it is believed that in carrying out leucocyto-therapy, that in order to produce an increase in the number of leucocytes and at the same time increase their functional activities without unnecessary strain upon the individual, it is eminently more logical for the organism to care for parenteral injections of substances similar to its own elements than to any elements which are of a foreign character.

It has been proved beyond a question of doubt that when leucocytic extract is introduced parenterally into the bodies of experimental animals for experimental purposes and into human beings and domestic animals for the treatment of disease, the physiological results produced are a marked increase in the number of white blood corpuscles, especially those of the polymorphonuclear variety. The value of this is demonstrated by the fact that in the actual therapeutic application of leucocytic extract to individuals suffering from disease, the regulation of the leucocyte count is coincident with the improvement of the diseases so treated.

The polymorphonuclear leucocyte is the cell which migrates in greatest numbers into tissues, the site of an acute inflammatory process or becomes more active during an attack of any disease which causes general systemic disturbances of a febrile nature. By virtue of its amoeboid motion it is enabled to pass readily through the walls of the capillaries into the diseased or injured tissues where it is actively phagocytic. In general systemic febrile conditions the activity of the polymorphonuclear leucocyte assists in the care and elimination of toxic end-products, thus inducing a rapid convalescence. The semi-solid exudate which fills the intercellular spaces of involved areas in a localized acute inflammatory process is liquefied by means of an enzyme which is the product of this type of leucocyte and the digested elements are carried off through the lym-

phatics. The accumulation of polymorphonuclear leucocytes about the affected area acts to some extent as a wall or zone limiting the infection and preventing further invasion of the tissues.

Therefore it can be readily understood that the action resulting from the administration of leucocytic extract makes this cellular extract of great value in the treatment of many of the acute conditions encountered in veterinary practice. It is indicated in the treatment of all infections and toxemias including purpura, laminitis, pneumonia, pleurisy, influenza, azoturia, strangles, coryza, laryngitis, lymphangitis, edema, septicemia and the toxic bowel conditions following enteric disorders.

Lymph gland extract (Archibald) has been proven to be of great value in the treatment of chronic infections and those diseases which usually run a long course, for while it also produces an increase in the number of leucocytes, the greatest increase is in the number of lymphocytes or mononuclear cells.

The lymphocyte or mononuclear cell is more active in the control of chronic infections and toxemias than is the polymorphonuclear cell. It produces an enzyme of more marked activity consequently producing a more rapid and complete digestion of the partially organized exudates. It is not easily destroyed by toxins and is therefore a more successful barrier to extensive invasion of the tissues.

From the above we must conclude that the polymorphonuclear cells are more active in acute infections while the mononuclear cells are more effective in the control of chronic infections.

It is interesting to note that not only are we able to produce a leucocytosis at will, but are also enabled to stimulate that type of leucocytes whose activity will be of greatest benefit in the condition to be treated.

Lymph gland extract is indicated in the treatment of unresolved pneumonias, chronic bronchitis, chronic laminitis, febrile conditions of long standing, and has proven itself to be the best known treatment for canine distemper and mammitis in cows.

Cellular extracts are today attracting widespread attention in the ranks of the veterinary profession, particularly the leucocytic and lymph gland extracts; the good results being obtained from their use in some cases being almost unbelievable.

REPORTS OF CASES

THE GELATIN TREATMENT OF PETECHIAL FEVER

R. R. DYKSTRA, Manhattan, Kans.

German veterinary literature records the successful treatment of several cases of petechial fever of horses by subcutaneous injections of fluidified gelatin. A mare weighing about 1100 lbs., and affected with petechial fever was presented for treatment at the veterinary clinic of the Kansas State Agricultural College.

HISTORY:—About six weeks previous to being brought to the college hospital the animal received a deep wire-cut in the fold of the fetlock of the right fore limb. The wire-cut was healing slowly, and this long convalescent period had weakened the patient.

SYMPTOMS:—Temperature slightly elevated, pulse weak, respirations accelerated and laborious. Extensive edematous swellings of the limbs, lower surface of the thorax and abdomen, and of the head. The nasal mucosa showed several large, and the vaginal mucosa small, hemorrhagic spots and streaks; the appetite was good though the swellings of the masseteric region interfered with perfect mastication. A small bed-sore was beginning to develop on the right hip. The wire-cut appeared to be in a healthy granulating condition.

TREATMENT:—The animal was placed in slings. Fluidified gelatin was prepared according to a modified formula of Dr. Johann Schmidt, Dresden, as follows:

1. Boil 1000 cc. of tap water in a flask and permit it to cool to 50 degrees C.
2. Add 10 grams of sodium chloride.
3. Add 10 grams peptone, previously triturated with a little cold water.
4. Add 100 grams of pure gelatin, obtaining solution by constant agitation.
5. Add the whites of two chicken eggs, previously mixed with a little water.
6. The entire mixture is then placed in a water bath for thirty minutes, forming a clear liquid interspersed with flakes and coagula.
7. Add 100 cc. of a 2% aqueous phenol solution.

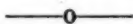
8. A very small quantity of sodium hydroxide solution is added to make the mixture slightly alkaline.

9. Filter through sterile filter paper.

10. Previous to injection liquefy the gelatin by placing it, in its container, in warm water.

Six hundred cubic centimeters of this fluid gelatin was injected subcutaneously, in six different places, with careful regard for asepsis. Moderate localized swellings and one abscess developed as a result of the injection. The former had disappeared in four days. At this time the hemorrhagic spots and streaks in the mucous membranes had disappeared, and the edematous swellings were disappearing. In order to hasten the latter a second subcutaneous injection of 400 cc. of fluidified gelatin was given eight days after the first. This was followed by complete recovery in a few days.

CONCLUSION:—No definite opinion, based on a single case, can be formed regarding the value of this treatment, though its action was apparently beneficial in this instance.



INTESTINAL INTUSSUSCEPTION IN CATTLE

Supplement to article in the March Number, 1915, of the
American Veterinary Review.

JOHN K. BOSSHART, Camden, N. Y.

CASE NO. V:—Invagination of Ileum due to Intestinal tumor.

This patient was a black and white grade cow, aged 12. She had been in perfect health until May 12, 1915, when it was noticed that she gave no milk. Upon keeping her in the barn it was also found that she had no appetite for food and drink and that no manure was passed. Salts were given her by the owner with no results.

On May 14 the cow was examined by the writer and pulse, respiration and temperature were found to be normal. Peristalsis was somewhat suppressed, rumination feeble. A rectal examination revealed the absence of feces, but the presence of a mucilaginous exudate streaked with blood. Uterus and ovaries were found normal, but there was a firm mass palpated just within reach. Owing, however, to the forward position this mass could not be more closely palpated. A provisional diagnosis of intestinal obstruction, probably due to invagination was given and operation advised.

On May 15 the cow was operated upon, Dr. R. C. Hartman of Pulaski assisting the writer.

One ounce of chloral hydrate was administered in one quart of cold water. A five inch incision was made after thoroughly preparing the field in the right flank. The animal was permitted to remain in the standing position. After opening the abdominal cavity the right arm was introduced to search for the obstructed bowel. This was easily found and delivered through the wound. It was clearly a case of invagination and it proved to be unreducible. Excision was indicated and properly done. End-to-end anastomosis by means of Lembert's sutures of catgut was obtained, the serosa sutured over it and fastened to the mesentery. Peritoneum and muscles were united separately with interrupted catgut sutures. Skin closed with silk.

Examining the removed part it was found to consist of over three feet of necrosed and devitalized intestine, the invagination being due to a tumor the size of a walnut.

The after care of this patient should have consisted in washing the wound with a hot saline solution twice daily and in giving small amounts of succulent food and water three times daily. The owner, however, permitted the cow to eat all she wanted the next day, which favor she certainly abused. The next day after that she was not able to rise to her feet and had lost her appetite entirely. After several days the owner was advised to draw her out into the lot and let her shift for herself, which she did. Ten days after this she was able to rise again to her feet, when assisted. Recovery was gradual from then on and complete. Her milk flow increased to 6 quarts night and morning until the middle of October when the owner sold her to a dealer.

CASE NO. VI. Another case of Invagination of the Ileum:

A four years old black and white grade cow was taken sick very similar to the previous one on Aug. 14, 1915.

Pulse, respiration and temperature were again normal. The hide however felt cold. A rectal examination again showed the mucilaginous exudate streaked with blood. The bladder was greatly distended and promptly catheterized. Uterus and ovaries normal. A firm floating mass was felt forward and downward, but it was not possible to grasp it or examine it by palpation.

Operation was advised and performed the next day, Aug. 16.

One ounce of chloral hydrate in one quart of cold water was

given at once and half that dose after the field of operation was prepared. The animal was in the stanchion, in the standing position when an incision into the abdominal cavity was made and a firm coil of intestine delivered through it which is shown in plate no. 4. The operation was completed as in case V. Recovery was uneventful.

The previous cases reported have been operated upon in the recumbent position and the experiment of carrying out this prolonged operation in the standing position is very gratifying. The intra-abdominal pressure is greatly lessened and consequently the

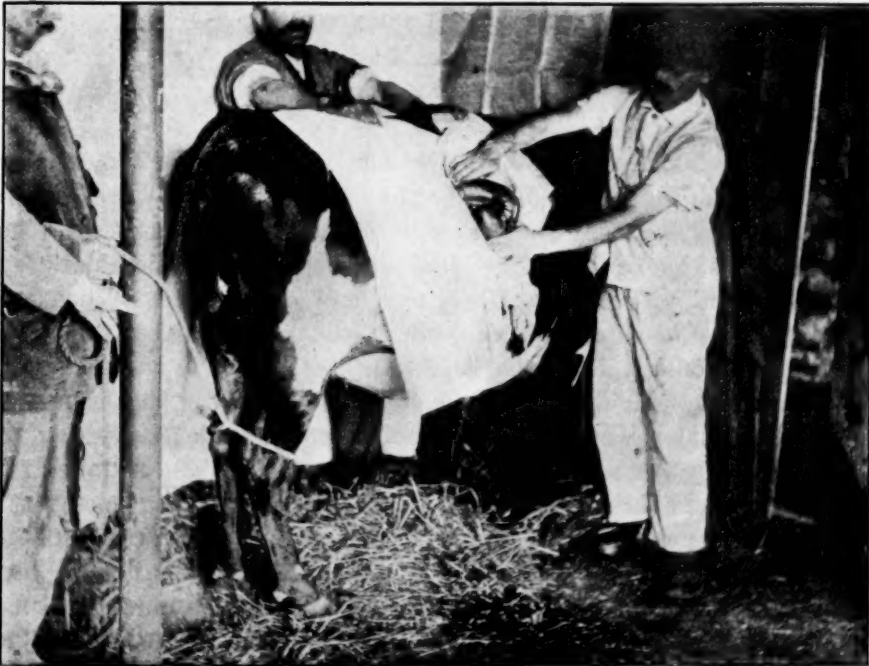


PLATE IV:—Operation for Intestinal Intussusception. Invaginated coil intestine prior to resection.

(Plates No. I, II, III have been published in the previous article.)

surgeon is less disturbed by protruding intestines. Foreign bodies, like exudates, blood or solutions, cannot enter the abdominal cavity so easily, especially when the incision is packed with dry gauze or linen.

Secondary attention should consist in providing a well lighted roomy place for the patient. Small amounts of grass, other succulent food or gruels and water should be given three times daily.

One pint of raw linseed oil or one pound of melted lard with stimulants should be given every second day until two weeks after the operation and then again as soon as the feces become firm or hard. An increase of grain, roughage and water should be allowed only gradually. The wound should be washed twice daily with hot salt-water. If primary union does not follow a stimulating antiseptic liniment should be applied.



LACTATION IN A FOAL.

W. J. CLEVELAND, Havre, Mont.

A Percheron mare, weight about 1400 lbs., age 9 yrs., owned by Mr. W. Judding near Buffalo Center, Iowa, foaled a mare colt in July 1910. This foal was perfectly normal in every respect. The dam at this time and for some time previous to parturition had been worked, and while not working was kept on pasture. When the foal was two or three days of age, the owner noticed that the colt's udder was enlarged. Upon further investigation it was found to contain milk. He milked out about a pint of milk at that time and he found that it was necessary to milk out the udder every day, at each milking he would get about a pint of milk. This continued for ten days, then the owner came to town to get something to stop the secretion if possible. He was given a solution of atropine sulphate and belladonna which he gave the foal morning and evening. When he began this treatment the secretion became less abundant until the tenth day when it had ceased entirely, and the foal continued to grow and developed into a fine colt.

ABSTRACTS FROM RECENT LITERATURE

INTERDIGITAL ABSCESSSES IN A SPANIEL TREATED BY VACCINE

H. TAYLOR, F.R.C.V.S.
Veterinary Record

For two years this dog suffered with very painful and now and then very large abscesses in the interdigital region. Many were the various treatments resorted to, but the trouble always recurred. It was then decided to try the effect of vaccine. Cultivations made from the coverings of swabs from the wound, had given cultures of *Staphylococcus albus* and a diphtheroid bacillus. An autogenous vaccine was prepared in vials of 1 cc. size and containing 300 million organisms in all, 200 million of the former and 100 million from the latter. Six vials were injected into the skin of the inside of the thigh, after painting the site of the injections with tincture of iodine. No constitutional disturbances or any local swelling following. The injections were made several days apart. But apparently the vaccine had no effect as the recurring abscesses reappeared with the same regularity as before. It must be noticed that since the injection, the dog had three of his paws affected at one time, whereas before he never had more than two. The size of the abscesses remained the same.

LIAUTARD.

THE PREPARATION OF HOG CHOLERA SERUM

HERMAN UBBENS—Veterinary Inspector—Amsterdam.
Serum Institut of Rotterdam. Director Prof. Dr. J. Peels.

Centralbl. Bakt. Parasit. und Infekt—Orig. Heft No. 3—Bd. 72, 1914.

CONCLUSIONS

1. Hog cholera serum has a protective value against the disease.
2. The serum injection followed by the injection of the infectious material resulted in an active immunity.
3. If exposed animals are not immunized as a result of the exposure they must be injected with serum in the event of cholera developing later.

4. The serum has not only prophylactic value, but fairly strong curative action in the early stages of the disease.

5. The serum from a bovine injected with hog cholera virus possesses no protective value against the disease.

6. The method of preparing serum (clear) through clotting and pressing is preferable to the method of defibrinating and centrifugalizing.

7. It is preferable to tuberculinize hogs used in the preparations of hog cholera serum and exclude those which react.

8. The serum recovered with the method of clotting and pressing the blood resulted in the recovery of approximately $\frac{1}{2}$ of the bleeding and not infrequently more.

Virulent blood for hog cholera serum is collected in glass cylinders, 6 cm. in diameter and 50 cm. long, and the bleeding is allowed to stand at room temperature for several hours. The bleeding is then placed in a refrigerator for 48 hours and then pressure, by means of a weight, is exerted on the clot for 24 hours. The clear serum is siphoned into the containers.

Of the six bleedings (table No. 1) the proportion of serum to blood recovered averages 25 to 50, i.e., serum to 100 volumes of blood. Of 10 pigs bled (table No. 3) the proportion varied from 20 to 100 and 59 to 100.

Cultures made from the liver, spleen, kidneys and serum of the 10 pigs revealed the presence of the hog cholera bacillus in the liver and spleen of 9 of the 10 and in the kidneys of 8 of the 10 and in the serum of only 1 of the 10. No hog cholera bacilli were found in any of these organisms or the serum of pig No. 3.

In another series of 22 virus pigs the hog cholera bacillus was demonstrated in the liver and spleen of 19 and in the kidneys of 16 and not in the serum of any.

HYPERIMMUNIZATION:—Immune hogs were first injected subcutaneously with 500 c. c. doses of virus, the dose has now been cut down to 200 c. c. as follows.

August	1.....	1 c. c.	Virus....	10 c. c.	Serum
	14.....	10 c. c.	"		
	28.....	100 c. c.	"		
Sept.	12.....	200 c. c.	"		
	26.....	200 c. c.	"		
Oct.	10.....	200 c. c.	"		
	20.....	bled 1000 c. c.			
	24.....	200 c. c.	Virus		

Nov. 4.....bled 1000 c. c.
 8.....bled 1000 c. c.

Aside from the example above and the statement that hyperimmunes are bled every 4 days no definite schedule of hyperimmunization and bleeding are given.

Reference is made to the fact that "many hogs are tuberculous". A number were tuberculin tested "intercutaneous" with 100 milligrams of undiluted tuberculin injected at the base of the ear. Table No. 5 includes the results of the tuberculin test of 12 hogs of which 9 are positive and 3 negative. The table also shows that hog cholera bacilli cannot be demonstrated culturally in the liver, spleen and kidneys of hyperimmunes.

Table No. 6 includes the results of the tuberculin test of 28 hogs in comparison with the autopsy findings for tuberculosis. Eleven of the 28 reacted and lesions of tuberculosis were demonstrated in all of the 11. In addition to these, however, lesions of tuberculosis were found in 8 additional hogs. In other words, in accordance with the autopsy findings 18 of the hogs proved tuberculous, while only 11 of the 18 reacted to the intercutaneous tuberculin test.

HYPERIMMUNIZATION OF AN OX:—The repeated subcutaneous injection of virus in increasing the dose, beginning with 250 c. c. October 2nd and ending November 11th with the injection of 520 c. c. failed to produce a serum with any protective value whatsoever.

PRESERVATION OF SERUM:—To every 100 grams of serum, 10 grams of a chinisol solution (Chinosollösung) 1 to 10 were added.

REICHEL.

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A CASE OF LEAD POISONING IN THE PIG

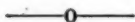
H. TAYLOR, F.R.C.V.S., Veterinary Record.

HISTORY:—A carpenter left a tin can containing about 2 lbs. of white lead paint in a cartshed on the ground. A sow three month pregnant ate it all. She was a large black animal and had covered herself more or less with some of the paint, which gave her a peculiar appearance. The next morning the whole thing was discovered, but nothing bad was expected of the event.

THE EFFECTS:—Two or three days after the animal was off her feed, her feces greyish white in color. She had a dose of Epsom's salts. In the next few days, she became dull, lethargic and ate but little. Eleven days after her lead festival, it was discovered that she had ingested about 2 pounds of the paint. With sulphates and iodide of potassium treatment she seemed to improve, although she showed some interference with her muscular action. On the 16th day, she was taken with brain manifestations, and ran about in an excited manner. Put in a pen, she raced about madly and blindly, banging her snout against the wall. One injection of morphia gave her little relief. She died about an hour after.

POINTS TO OBSERVE:—Length of time which elapsed between the ingestion of the paint and death. No abortion took place. Apparent recovery was followed by sudden brain manifestations—feces about normal in color at the latter end of the case—violence of the brain symptoms compared to the slight muscular ones. No blue line around the gums was detected.

LIAUTARD.



A BACTERIOLOGICAL STUDY OF TUBERCULOSIS OF THE LYMPH GLANDS IN CHILDREN

A. P. Mitchell, M. D., in the *Edinburg Med. Jour.*, Sept., 1914, No. 3, S. 209 Ref. Zbl. f. d. ges. Tuberkuloseforsch IX—4, sets forth the results of his findings in twenty-nine cases of tuberculosis in children under 12 years of age. Special attention was directed to the examination of the cervical, bronchial and mesenteric lymph glands, with an occasional examination of the tonsils. Upon testing twelve of the 29 cases for their cultural characteristics and virulence for rabbits it was found that eight proved to be of human and four of bovine type. Three of the children infected with the bovine type died of tubercular meningitis and one from intra-peritoneal haemorrhage, with all four cases revealing the primary seat of infection to be in the mesenteric glands. However, in two of the four cases the cervical as well as the bronchial glands were also infected. The eight cases which were infected with the human type of bacilli seven were found to show the primary localization in the bronchial gland, in the one remaining case the original seat of infection was uncertain. Tubercular bacilli were found in all the glands in the cases cited. In the 80 cases of tuberculosis reported

by Dr. Mitchell in The British Med. Jour., Jan. 17, 1914 he states that the bovine bacilli were present in 71 instances (88 percent) and the human bacillus in 9 cases (12 per cent). These eighty cases were surgical and the organisms were isolated from the cervical glands. Without exception all the above cases were of children under 12 years of age. Eighty-four percent of the children under two years of age were fed with unsterilized milk since their birth. In regard to the bovine cases it seems more than a coincidence that in not a single case was there a history of pulmonary tuberculosis in other members of the family, but, continues the writer, children of the same family in some instances showed cervical tuberculosis. It was found upon investigation that in 406 samples collected from the City of Edinburg that 82 (20 percent) contained tubercle bacilli.

MANSFIELD.

HYDATID DISEASE IN A DOG

H. A. REID, F.R.C.V.S.

Veterinary Journal

This is the illustrated record of a case observed in an aged collie dog which had been suffering with obstinate constipation and was rebellious to enemas and large doses of castor oil. His abdomen was much distended by ascites. The respirations and pulse were slightly accelerated. There was no jaundice. Chronic liver disease was diagnosed and at the urgent request of the owner, a treatment of aloin and calomel was prescribed, the abdomen having been tapped and relieved of about two quarts of sero-sanguinous fluid. Some relief was at first manifested but extreme emaciation took place and death followed from exhaustion. At the autopsy, the liver was found weighing three pounds and nine ounces, the gall bladder being greatly distended. The liver was the seat of a very extensive infection of *Echinococcus polymorphous*. Two cysts were found also in the spleen. In the bowels, there were numerous specimens of *Taenia marginatae* and *Dipylidium caninum* with also a number of *Taenia echinococci*.

LIAUTARD.

CATARRHAL FEVER COMPLICATED WITH IRREGULAR STRANGLES
AND TERMINATING IN GLANDERS

WM. SCOTT, F.R.C.V.S.
Veterinary News

This is a lengthy and interesting record, in which the writer was consulted, for a cob which had catarrhal fever. Profuse bilateral nasal discharge, sore throat, œdema of the pharyngeal mucosa, soft moist cough, œdema of the head, lips, four legs, sternum and sheath. Nodular growths on each side of the cheeks, some hard and fibrous, others soft and pointing, some discharging pus. Sub-maxillary glands swollen. Tubular and parenchymatous pulmonary invasion had taken place.

DIAGNOSIS. Catarrhal fever, complicated with strangles, with phenomena simulating purpura. The bacteriological diagnosis revealed the presence of streptococci, diplococci, staphylococci, and a pseudo-micrococcus catarrhalis.

From these a stock vaccine was prepared and given at various intervals, the composition of the vaccine being increased as per indication. After two weeks of treatment the cob was turned out and convalescent.

Some ten days after, he had a severe postpharyngeal abscess. Then a sero-bloody purulent nasal discharge appeared.

The mallein test was then resorted to. The sub-cutaneous, the ophthalmic and the intra-dermo-palpebral method was applied. The three gave a positive reaction, But the thermic reaction was negative. The test was renewed and again the same result obtained. The cob was finally destroyed by military orders and revealed at the post mortem lesions of glanders in the nasal cavities and of lobar pneumonia in both lungs.

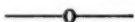
The writer remarks in conclusion—:“To obtain such positive results with three methods and a negative thermal sounds paradoxical, and may be explained in the fact that the use of vaccines prior to the mallein test may have so altered the body metabolism that a state of prophylaxis, or something akin to it, as against anaphylaxis had been established——.”

LIAUTARD.

A FATAL CASE OF TUBERCULOSIS OF A BOVINE ORIGIN

H. Bietzke (B. Kl. W. 1914, No. 33) describes a fatal case of tuberculosis in a 14 year old boy. Upon inoculation of both rabbits and cattle, Beitzke proved that the organism causing the boy's death to be of a bovine type. Thereby disproving the findings of Weihrauch, Heilstatte Edmundsthal in. Int. Zbl. f. d. ges. Tuberculoseforschung Klin. Beitrag IX, 4, that bovine tuberculosis was not harmful to man. Statistics collected by Weber show that over fifty per cent. of the deaths resulting from tuberculosis in children under two years of age are due to the infection with the bovine type.

MANSFIELD.



NUMERICAL ANOMALY OF THE INCISORS OF A HORSE

MR. M. PETIT
Bulletin de la Soc. Cent.

The upper jaw of this horse had ten incisors of the second dentition,—well-developed and irregularly arranged in two rows. The most external of the teeth overlapped over the anterior face of the incisor arch and seemed to have been pushed out by the internal. The length of the teeth was normal except one of the nippers which was greater. All the teeth were worn, but not regularly. The lower jaw had the normal number of incisors, shorter on the right side. They were triangular, the form that the teeth presented was that of a sixteen year old horse.

Similar cases of anomalies have already been recorded; they all take place on the upper jaw. Yet Lafosse and Goubaux have mentioned observations where both incisor arches were affected, and where the horses had twenty-four incisors.

LIAUTARD.



ATHEROMATOUS GREAT MESENTERIC ARTERY CAUSE OF DEATH

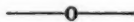
MAJOR DOCTOR PRUNEAU
Bulletin de la Soc. Cent.

A thirteen year old horse slipped on the pavement, with all his four feet, and fell heavily on the right side and had to be aided

to arise. He had an anxious expression of the face, shook all over and could not move. Slowly and with difficulty he was brought to his stable, where he died after a short period of agony.

POST MORTEM. Extensive ecchymotic spots on the right side of the body. No fracture. On opening the abdomen, blood and clots escaped in quantity. Around the kidneys and enveloping them there was an enormous clot. The liver and spleen were normal. The mesentery had a tear, eight or ten centimetres long and between its folds there was a clot as big as a child's head, from the center of which was exposed the gaping and still bleeding rupture of the great mesenteric. The intestines were normal. The aorta in its whole length showed atheromatous plates, with calcareous infiltration, more abundant in the abdominal than in the thoracic portion. The heart and valves were normal.

LIAUTARD.



THE MALLEIN OPHTHALMIC TEST IN GLANDERS

PROF. DR. JOSEF SCHNURER (Vienna)

Recorder for the X International Veterinary Congress

Monatshefte für Praktische Tierheilkunde XXVI Band 3./4. Heft.

CONCLUSIONS

1. It is possible to eradicate a glanders epizootic by killing clinically sick horses and by a diagnostic examination of horses found to be ailing. Immunization treatment is at least superfluous.
2. The most practical diagnostic method is one which, in comparatively short time (12-24 hours) gives reliable results even in the hands of people not possessing special training in this branch. A method which is simple to carry out and easy to form judgement on; and further, which lends itself to mass examination on the boundary and temporary investigation in the country itself and, at the same time, a method which is comparatively cheap.
3. The serological methods (agglutination, complement fixation, precipitation, conglutination, the Adberhalden and anaphylaxis reactions) do not either alone or in combination, fulfill these requirements, since they must invariably issue from a central station.
4. On the other hand all the above mentioned conditions are fulfilled by the mallein ophthalmic test operated by applying a

reliable concentrated mallein with a brush, pledget of cotton, glass rod or similar appliance but not by dropping in with a pipette or dropping bottle. Of 93,352 ophthalmic tests carried out in Austria (with the exception of Galicia and Bukowina) in the years 1910-1913, 341 glandered horses reacted 88.8% positive, 7.6% doubtful and 3.5% negative. Of 75,897 healthy horses, 99.6% showed a negative and 0.34% a positive reaction. The results which miscarried in the case of the glandered horses (3.5%) are to be attributed partly to the fact that the horses were only tested once several days before death, and partly from the probability of mistaken judgement and errors in the postmortem diagnosis (autopsy).

5. In order to clear doubtful cases, one can now and again provisionally draw on a serological reaction (agglutination or complement fixation). The conjunctival test does not interfere with the agglutination reaction.

6. Should even the serological reaction not lead to a rapid decision, the classical subcutaneous reaction with a standardized mallein is to be recommended. In drawing conclusions from this test, stress must be laid on the average temperature from 10 readings taken on the day after the inoculation. Under certain circumstances the temperature on the second day must also be taken into consideration. Of 46 glandered horses all showed a positive reaction and with 464 healthy horses 95.04% gave a negative result, this showing 4.96% of miscarried results in the case of the healthy horses.

7. The miscarried results of the mallein ophthalmic test and the subcutaneous reaction with healthy horses are accounted for by a hypersensitiveness towards mallein due to an existing glanders infection. This kind of animal can be correctly classified by consideration of the body temperature before and several days after the inoculation.

8. Going out from these fundamental principles it has been possible to eradicate indigenous glanders from Austria and to keep the whole country (with the exception of Galicia) free from glanders for months at a time in spite of severe incursions from heavily infected countries.

9. The imposition of a minimum period for traffic curtailment of suspected animals (quarantine period)—in Austria 60 days, in Germany 6 months—is for the present superfluous and inflicts an

unjustifiable hardship. The quarantine period should be made solely dependent on the results of the diagnostic examination.

10. It is not justifiable to kill horses which have only reacted positively in the mallein test or in the agglutination reaction and which otherwise exhibit no clinical disturbances, namely, no average temperature over 38°C. taken from a consecutive range of readings. Such horses are in all probability non-infected. The relationships in this case stand as in tuberculosis of cattle.

REICHEL.

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A FEW CLINICAL OBSERVATIONS FROM THE SEAT OF WAR

Reported by MR. JACOULET
Bulletin de la Soc. Cent

1. PERIOSTITIS AND TRAUMATIC OSTEITIS by Mr. Noiseux.

Sorrel gelding, anglo-arab, nine years, had on the left hind cannon bone a gun shot wound, whose entrance was on the external face, a little above the fetlock joint, and the exit on the internal face a little higher than the other. Bloody suppuration escaped. A little above the place of exit, there was an abscess forming. The cannon bone was swollen, no weight was put on the leg which was held up and showed lancing pains. Diagnosis of fracture was left aside, but possibly the bone was partially split. Treatment, consisted of antiseptic care of wounds and frequent warm water lotions. After three days the abscess of the inner face of the cannon bone was punctured. Venous hemorrhage followed with formation of hematoma. Sloughing of the skin took place and improvement became manifest, the horse laid down himself and arose without help. On the tenth day, a swelling appeared on the anterior face of the cannon. An incision was made and two days after a piece of shrapnel, flattened on one face and convex on the other was extracted. Several others were removed at various times after a few days. The animal then walked fairly well and after a month's treatment resumed his work.

2. WOUND OF THE TESTICULAR REGION by Mr. Noiseux.

Arab stallion, six years old, received a ball on the posterior face

of the right thigh, which came out towards the middle of the internal face, close to the perineum. No important organ was injured. Lameness was slight, the fistulous tract healed rapidly. But there was on the scrotum a deep wound, which in some motions of the leg, while the animal walked, corresponded to the internal face of the thigh and it was supposed that perhaps the ball had penetrated through the scrotum and also the testicle. No exit opening was visible, the ball then was lodged in the organ. Soon the testicular organ swelled and became very painful. The animal rebelled against all hand examination. On the 6th day, an abscess formed, and was lanced, and an abundant escape of pus took place. The animal became more quiet, and the examination showed that the right testicle was drawn upward towards the entrance of the inguinal canal and the left was found twice as big as its normal size. The fistula of the abscess was probed and the foreign body detected. Two fistulous tracts developed and finally a very small piece of shrapnel embedded in the tail of the epididymis was extracted. Final cicatrization took place in a few days.

3. WOUND OF THE NECK by Mr. Lange.

Dappled grey gelding, eight years, had on the left side of the superior extremity of the neck, a wound whose superior border measured 20 centimetres. It began near the posterior portion of the parotid and terminated backward over the projecting parts of the muscles. The inferior border was convex downwards and ran parallel to the jugular groove. There was an abundant discharge of pus and the odor coming from the wound was very offensive. After disinfection, the four fingers could be introduced in the funnel shaped wound, whose bottom reached the median line of the neck, six centimetres below the atlas. Between the inferior border of the right parotid and the posterior border of the corresponding inferior maxillary, there was a big swelling from which escaped an abundant discharge, flowing towards the chin. Three fingers could be introduced, passing along the inner face of the maxillary bone and fragments of necrosed vertebral ligament were removed. No foreign body was detected. The laceration was the result of an obus bursting and yet all the important organs of the region escaped injury. A month's treatment and the gelding was well.

LIAUTARD.

PROCEEDINGS OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION

REPORT OF THE COMMITTEE ON DISEASES

(Continued from page 251)

15. The livestock sanitary authorities to be given power to provide in a practicable manner against the dangerous pollution of streams with hog cholera virus and provide for the safe disposal of garbage liable to be infected with hog cholera virus.

16. To prevent the spread of hog cholera by swine shown for exhibition purposes, such swine to be treated with serum and virus not less than twenty-one days prior to the opening date of the exhibit, or with serum alone not more than fifteen days before such time.

17. Provision for controlling for thirty days, by quarantine or otherwise, when deemed advisable by the proper authorities, of all swine treated with serum-virus, or premises on which such swine are kept, to prevent danger of possible spread of infection from inoculated animals.

If the above or similar regulations could be instituted and enforced there is no doubt that cholera in swine would be materially diminished and could with the judicious use of serum ultimately be eradicated from this or any other country. Since the advent of anti-hog cholera serum the enforcement of sanitary regulations has been neglected. In order to obtain and enforce efficient sanitary measures the pork producers must first be educated to the necessity of such measures.

The application of some of the simple sanitary rules has proved of very great monetary value to swine raisers. As an illustration the separation of the infected from the healthy swine by means of a clinical thermometer and the proper after care has been the means of saving over 50% of many infected herds.

If more consideration was given to proper hygienic care and sanitary control and less to the production, distribution and application of serum it is possible that hog cholera would soon become a much less serious disease economically than it is at the present time.

Two general methods are utilized in the immunization with anti-hog cholera serum, viz, the serum alone method and the simultaneous method.

The exact method of administering serum has been freely discussed at various associations and numerous articles have appeared in various publications. The operator must always provide clean and sterile instruments. It is true that the instruments become contaminated as soon as used but at least two needles should be provided in order that one may be placed in a disinfecting solution while the other is in use. The syringe should be sterilized by boiling, after being used for a few hours or after a herd has been immunized, before using it on another herd. The serum and virus should be injected deeply into the muscle in order to insure rapid absorption. Bad results frequently are the result of failure of absorption of the serum or virus that has been injected just beneath the skin in the subcutaneous fat. Swine that are in filthy muddy pens should not be injected because of the probability of infection in the needle wounds. Swine that are injected should be reasonably clean and the point of injection should be painted with tincture of iodine and the skin should be pinched after withdrawing the needle to prevent leakage.

The serum alone method produces an immunity for a period of from one week to three months but it does not entail any danger of infecting and producing cholera in a cholera free herd and establishing a new center of cholera in a community free of the disease. By the proper use of serum alone in communities where there are only a few centers, cholera could be efficiently controlled. In such cases the infected herd and all surrounding herds should be immunized and if necessary the process could be repeated six weeks later. This method of control is not as applicable when several counties of a state or the entire state is infected. Serum alone when given in large doses is of considerable value in the incubation period of the disease before the animals show visible symptoms, but after the temperature has risen. The judicious use of serum in such cases has saved as high as 80 or 90% of the exposed herd. The serum alone is recommended for immunizing pregnant sows but the simultaneous method should also be used to immunize swine that are to be introduced into healthy susceptible herds.

The dose of the serum alone treatment should not be less than 30cc. for each hundred pound live weight of hog.

The simultaneous method is used more extensively than the serum alone, because it produces a longer immunity. The dose of serum used in the simultaneous method should be 50% more than

the dose in the serum alone method. The serum and virus must be introduced separately in different parts of the body.

This method may be used successfully in exposed herds especially in those swine that do not show a high temperature. But the virus should not be given to hogs that are showing visible signs of cholera.

The one serious disadvantage of the simultaneous method is the fact that infection is introduced. Good authorities claim that a hog immunized by the simultaneous method does not eliminate the virus unless he dies of the disease but this statement has not been clearly proven and even though the virus is eliminated only in case of fatal illness of the immunized hog the procedure is dangerous to say the least. The extensive epizootic of hog cholera in Iowa and adjoining states in 1913 bears the ear marks of the results of simultaneous immunization. To say the least the use of the simultaneous method is contrary to good sanitation.

A so-called double method has been advocated by some for the prevention of cholera. It consists of the serum alone immunization followed ten days later by the simultaneous method. The efficiency of this method is questionable and it is expensive.

In time the application of serum in the control of hog cholera will be rationally adjusted and this combined with the proper enforcement of efficient sanitary regulations will result in diminishing the losses from this disease and the swine industry will be profitably pursued.

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THE PREPARATION AND USE OF HOG CHOLERA SERUM AND THE TREATMENT OF HOGS SICK WITH CHOLERA

S. H. GILLILAND, V.M.D., M.D.

The earliest record of the use of serum for the prevention of hog cholera was made in 1897 by Preisz, who obtained the serum from swine that had recovered from an attack of hog cholera. Shortly after the announcement in 1904 by de Schweinitz and Dorset that the true cause of hog cholera was a filterable virus, Dorset, McBride and Niles devised a method of immunizing swine against hog cholera. This method was termed "Hyper-immunization."

The United States Live Stock Sanitary Association at its annual

meeting in December, 1913, outlined some recommendations bearing upon hog cholera control and the production of hog cholera serum. Their recommendations for the production, distribution and administration of the serum is divided into four headings, as follows:—

“A. *Location of Buildings*: The location to be such that the surroundings will not interfere with sanitary production and that their operation will not contaminate surrounding areas.

“B. *Construction of Buildings*: The construction of buildings to be of material that will permit of daily cleaning and disinfection, stone, brick, tile and concrete being especially recommended.

“C. *Arrangement of Plant*: The arrangement of buildings to be such as to facilitate the production of a pure and uncontaminated product. The swine are to be kept in separate buildings, located a sufficient distance from the building containing the bleeding (either virus or serum) and hyperimmunizing room and in which swine are to be placed for the latter purpose only. The serum bleeding room and the hyper-immunizing room to be separate and distinct rooms. The preparation of serum and the preparation of virus from the whole blood to be operations conducted in separate and distinct rooms without direct communication with each other or with the foregoing not larger than an opening which will permit the transfer of receptacles containing the freshly-drawn blood and to be used for no other purpose. Separate washing and sterilizing rooms to be provided. The prepared serum and virus to be stored in properly cooled rooms. Swine kept for virus production and the testing of serum to be properly isolated so as to reduce to a minimum the danger of spreading infection. Separate and distinct feed rooms to be provided for such animals. Mortuary, crematory, abattoir and desiccating or rendering plant operated for utilizing the waste products of the establishment to be located so as to prevent contamination from this source. Necessary dressing and toilet rooms properly equipped and located to be provided. Also, bottling and packing rooms. Provisions for the sanitary disposal of manure, offal and debris.

“D. *The Operation of the Plant*: The operation of serum plants to be under the direct supervision of a competent veterinarian, who is a graduate of a recognized veterinary college as prescribed by the U. S. Department of Agriculture. Provision that all serum and virus be produced from healthy animals and be free from injurious organisms or substances. The label on the container to show that serum has been tested according to regulations prescribed by the U. S. Bureau of Animal Industry and comes up to the required standard of potency and purity. Similar regulations in regard to virus.

“E. *Distribution and Administration*: The virus in connection with serum or virus alone to be shipped, sold or supplied to

and administered by specially licensed persons only, and under direction and supervision of state authorities as far as practicable."

PREPARATION OF SERUM. The production of hog cholera serum cannot be classed as a difficult procedure. One of the most essential facts is a careful technique by trained laboratory workers in order to keep the serum free from extraneous organisms.

The selection of the hog to be immunized should be made with care. All animals selected for this purpose should be tuberculin-tested by the intradermal method to prove their freedom from tuberculosis. They should also be kept in quarantine under veterinary observation for a period of at least ten days, to prove that they have not previously been exposed to an infection such as foot-and-mouth disease. It has been reported that hogs of the bacon type are better adapted to the production of serum than those of the lard type. It is obvious that if the tail method of bleeding is to be used, that a hog with a long tail is desirable. Again, if the intravenous method of injecting the virus is to be followed, hogs with heavy ears and prominent veins are best suited for this purpose. The hogs should preferably weigh from 100 to 200 lbs. Hogs weighing more than 200 lbs. are difficult to handle. There are several methods by which immune hogs may be obtained. One is to secure hogs that have passed through an attack of cholera and have been left with an acquired immunity. These kind of hogs are hard to procure and greatly increases the cost of production. Another method is to purchase the number of hogs required and give them an injection of hog cholera serum and then expose them to hog cholera virus infection by placing them in infected pens and associated with hogs sick with cholera. The most reliable method and the one recommended by this committee is to procure a number of healthy hogs and after carefully testing them with tuberculin as above recommended and keeping them under observation for a period of ten days, they are given the simultaneous method of treatment, which consists in the injection of 1 to 2 cc. of virulent virus blood and from 20 to 40 cc. of serum. The dosage of the virulent virus blood and the serum depends upon the size of the animal to be immunized. After twenty-one days from this double treatment the animal is then ready for hyper-immunization.

PROCESS OF HYPER-IMMUNIZATION. The immune hog that has received the simultaneous treatment as above-described, after 21 days is ready to be hyper-immunized and may be treated by one of

the following methods. In practical work it has often been found advantageous to use one process and at times another.

I. *Subcutaneous Method.*

- (a) Inject the immune hog subcutaneously with virulent virus blood in the proportion of 8 to 10 cc. of blood for each pound of body weight.
- (b) Inject the immune hog subcutaneously with 1 cc. of virulent virus blood for each pound of body weight. Then after an interval of one week give a second injection of 25 cc. of virulent virus blood for each pound of body weight. After another interval of one week give a third injection of 5 cc. of virulent virus blood for each pound of body weight. The injections are made subcutaneously in the region of the groin and on the abdomen.

II. *Intravenous Method.*

- (a) Inject the immune animal intravenously with virulent virus blood in the proportion of 5 cc. of blood for each pound of body weight.
- (b) Inject the immune animal intravenously with virulent virus blood in the proportion of 5 cc. of blood for each pound of body weight, and then after an interval of one week, if the hog has fully recovered from the previous inoculation, repeat the injection.

III. *Intra-abdominal Method.*

Inject the immune hog intra-abdominally with virulent virus blood in the proportion of 10 cc. of blood for each pound of body weight.

The above directions for hyper-immunizing the immune hogs are not inflexible, and therefore satisfactory results may be secured by modifying the method of administration in regard to the number of doses given, as well as the dosage of the virulent virus blood, but it is generally believed that little will be gained by increasing or diminishing the amount of virulent virus blood from that stated. Experience has shown that larger amounts cannot be conveniently injected and that smaller amounts result in a serum of lower potency. Hog cholera serum produced by any of the above methods of hyper-immunization appears to be equally potent. The intravenous method of injecting the virus is recommended, though it is somewhat more difficult to give, especially in the hands of the beginner. The virus is injected into the large veins on the upper surface of the ear. This method has the advantage of requiring less virus blood than either the subcutaneous or intra-abdominal method. It is essential that the injections be made in an aseptic manner in all the methods.

The quick subcutaneous method (a) is not as safe as the slow subcutaneous method (b), for the hog is occasionally killed by the single large dose of virulent virus blood. It has been reported that hogs hyper-immunized by one large subcutaneous injection usually regain their health more slowly than hogs treated by the other methods.

The most potent serum produced by Dorset & McBride (1) appears to have been with a slow method of immunity. In one of their animals, No. 1383, 5 cc. of this serum protected 30 to 35 pound pigs from inoculation with 1 to 2 cc. of virulent virus.

As a rule the immune hogs are not greatly affected by the hyper-immunization injections providing the virulent virus blood is not contaminated and the injections made in an aseptic manner, the most notable symptoms being loss of appetite and listlessness for a few days. If too large a quantity of virus is injected at one place in the subcutaneous method, soreness and stiffness is liable to follow and in a number of instances abscess formation. In almost all cases the immune hog will have recovered from any ill-effects from the virulent virus injections in a few days, and after eight or ten days is ready for bleeding.

It is advisable that all hogs for hyper-immunization purposes be described and numbered by an ear tag. This description and number should be placed on a record card and this record card should follow the animal through the entire treatment and should contain information upon the date and dosage of treatment, the daily temperature measurements, the date and amount of blood recovered as well as a final autopsy of the animal.

PRODUCTION OF VIRULENT VIRUS BLOOD. The production of virulent virus blood is an important problem in the manufacture of hog cholera serum, as it is required in large quantities not only for the hyper-immunization of the hogs at the serum laboratories, but is required in conjunction with the serum in the application of the simultaneous method of preventing hog cholera. It is further important that the virus blood be of a standard potency. There are three methods by which virus blood may be obtained.

(a) *Slaughter House Virus Blood.*

This is the easiest method of securing virus, though it is the least desirable. Where it is done the usual plan is to take the hogs that show signs of cholera

(1) U. S. Bureau of Animal Industry Bulletin 102, pg. 39.

when received at the slaughter house, and when killed save the blood from them. In such cases the animals should be examined to ascertain whether they contain lesions of cholera. Virus blood obtained in this way is bound to vary in potency and it is often difficult to collect it in a manner that will insure it from containing a number of extraneous organisms.

(b) *Field Virus Blood.*

It has been observed that the virus of cholera is apparently more virulent at the commencement of an outbreak of hog cholera than later on. It has been suggested that if we take the first few animals that appear real sick when the disease first appears on a farm, and bleed them, we will obtain a virus that is usually of high virulence. This method of obtaining virus blood is followed largely in the state of Ohio and is considered better than the slaughter house method of obtaining virus.

(c) *Injection Method.*

This method appears the most reliable and is the one recommended to be used. It is first necessary to obtain a virus of the highest virulence and then reproduce it in young animals weighing from 60 to 100 lbs. It has been found that hogs of this age and weight are more susceptible than older animals. Virus obtained under this method is of known potency and it can also be drawn under more aseptic conditions. However, the greatest disadvantage to the method is the cost of the young shoats for the production of the virus. In producing virus after this method doses of from 2 to 5 cc. of virus is injected into the muscles of the inner side of the thigh. If the strain of virus used is virulent the animal should show evidence of cholera by the fifth day, and as soon as the symptoms are pronounced the animal should be bled. The blood from animals killed in a moribund condition or allowed to die is liable to contain contaminating organisms.

Each animal for the production of virus blood should be tuberculin-tested and kept under veterinary observation in non-infected pens for a period of ten days before the virus is injected. The animal should also have a record card showing the daily temperature measurements, weight, amount of virus given, amount of blood obtained and autopsy.

The method of removing the blood from the virus infected pig is to confine the pig on its back in a trough-like table with the pos-

terior end of the table elevated. The blood is taken from the larger vessels of the neck in an aseptic manner. The skin must first be thoroughly cleansed and rendered aseptic. The operator must wear a sterile coat and surgeon's rubber gloves. All instruments should be thoroughly sterilized. The virus blood should be immediately shaken as soon as drawn in order to prevent the formation of a clot. It is then filtered through several layers of sterile cotton or gauze. This virus blood is then kept in sterile bottles on ice until used. It is recommended that it be used as soon after drawn as possible. To the virus blood to be used for hyper-immunization purposes, no preservative need be added. It is, however, advisable to add one-half of one per cent carbolic acid as a preservative to the virus sent out for field work, in connection with the simultaneous treatment. Guinea pigs should be inoculated and cultures made from all lots of virus blood to prove its freedom from contamination. It is customary and is recommended that the virus blood for hyper-immunizing purposes should be used within 24 hours after it has been drawn. It should be free from extraneous organisms of any character.

After the virus pig has been bled to death a careful autopsy should be performed, and unless typical pathological lesions of hog cholera are found upon post-mortem examination, the virus blood should not be used.

There is another method of obtaining virus from infected pigs which consists in injecting a litre or more of normal saline solution into the peritoneal cavity and some hours later killing the animal and recovering the salt solution. This method has not met with general favor.

BLEEDING OF HYPER-IMMUNIZED HOGS. The hyper-immunized hog may be bled seven to ten days after the last dose of virulent virus blood. There are two general methods of bleeding, the tail method and the quick method from the vessels of the neck. The animal is confined according to the method to be used. The room, utensils and everything connected with this work should be specially prepared in order that the blood withdrawn may be free from contamination.

In the tail method, about one inch of the tail is clipped off with a sharp chisel after it has been thoroughly cleansed. The blood is allowed to flow into a sterile receptacle. Haslam, Hogan and Christian¹ have devised a vacuum method of drawing the blood

(1) Journal of Infectious Diseases, Vol. 16, No. 3, pg. 491.

from the tail which increases the yield of serum and decreases the labor. The amount of blood to be drawn by this method is about 5 cc. for each pound of body weight. After three bleedings from the tail at intervals of one week, the animal can again be given an injection of virulent virus blood. If the intravenous method is used, 5 cc. of virus blood to each pound of body weight is given. However, if the subcutaneous method of administering the virus blood is followed, then about double the dose should be given. At some plants as many as four tail bleedings are made before the animal is "re-hyperimmunized."

If the blood is drawn from the large vessels of the neck the animal is bled to death at once the same as obtaining the virus blood. The blood as soon as drawn is defibrinated by shaking or passing through a fruit juicer and then filtered through sterile cotton or cheese-cloth. The resulting filtrate is known as "Hog Cholera Serum", but is really defibrinated blood. To this defibrinated blood there is added a sufficient quantity of 5% carbolic acid solution so that the total volume contains $\frac{1}{2}$ of 1% carbolic acid. In some laboratories the defibrinated blood is centrifuged in order to remove the blood cells and thereby obtain a clear amber-colored serum. This is to be advised even though it does increase the cost of production.

DETERMINATION OF THE POTENCY OF THE SERUM. The potency of the anti-hog-cholera-serum is tested in the United States by administering serum to susceptible pigs and then inoculating them with virulent virus blood, at the same time giving two or more pigs virulent virus blood without serum. If the pigs receiving both serum and virulent blood survive and those receiving only the virus blood readily succumb, the serum is declared of sufficient potency to be sold. All hog cholera serum offered for interstate sale in the United States must be subjected to the rigid test required by the Bureau of Animal Industry, which is as follows:—Select eight pigs known to be susceptible to hog cholera and weighing from 30 to 60 lbs. each and divide them into four groups of two pigs each. The first group is to be injected with 2 cc. of virus blood, the potency of which is known, and 10 cc. of the serum to be tested on the opposite side of the body from which virus blood is injected. Group two is to receive the same quantity of virus blood and 15 cc. of serum. Group three to receive the same quantity of blood and 20 cc. of serum. The two animals in group four are to receive the virus blood

only. To consider the test satisfactory the pigs in group four that receive no serum should show symptoms of cholera within seven days and should die or be killed within fifteen days, at which time they are autopsied and must show typical acute hog cholera lesions. Temperature measurements of all the animals are to be taken and recorded daily.

If the two pigs which receive only the virulent blood die, and those which receive 10 cc. of the serum sicken but recover, while those which receive the larger doses of serum remain well, the serum is then considered of sufficient potency for use. It has been found that nearly all hogs properly hyper-immunized will yield a serum which is sufficiently potent to use in doses of 20 cc. to protect pigs weighing between 20 and 100 lbs. Carrying out this idea of always using a dose of 20 cc. for hogs weighing from 20 to 100 lbs., it is only necessary in standardizing to determine the action of a serum in a dose of 20 cc. If the test pigs do not sicken after a simultaneous injection of virulent virus blood and 20 cc. of the serum, the serum may then be considered suitable for practical use. Of course great care is necessary to avoid misleading results. Susceptible pigs must be used for the tests, and the virus blood must be of undoubted virulence as shown by its effects on the pigs which receive no serum.

It has been found that the defibrinated blood or serum may be kept for a year or over without greatly losing its potency. However, it is necessary that it be kept at a temperature of 35 to 40°F. All lots of serum should be tested bacteriologically as well as physiologically. Any lots of serum found to contain pathogenic organisms should be discarded. The ideal serum should be free from all extraneous organisms. A guinea pig should be able to stand an intraperitoneal injection of 1 cc. of the serum without any ill effects.

STANDARDIZATION OF HOG CHOLERA SERUM. Haslam and Franklin¹ have attempted to eliminate some of the sources of error in standardizing anti-hog-cholera serum by comparing the serum to be tested with a standard, centrifugated, dried anti-hog-cholera serum. The dose of serum which protects all of the pigs from visible symptoms of the disease and from continued temperatures above 104° F. is termed the P plus dose and the dose which just fails to protect is termed the P minus dose.

The serum was dried in a Faust drier at a temperature below

(1) *Journal Infectious Diseases*, Vol. 15, No. 2, Sept. 15, '14, pp. 257-267.

40° C. and subsequently dissolved in sterile water and restored to its original volume.

The defibrinated blood was distinctly less potent than the centrifugated serum and the washed corpuscles had very slight protective value.

It was also determined that storage of the serum in aluminum vessels for 24 hours did not measurably effect its potency.

Some of the factors that interfere with the accurate standardization of hog cholera are the varying strength of hog cholera virus, the various grades of susceptibility exhibited towards hog cholera by pigs of different breeds, ages, weights and sources, and the deterioration of the virus and serum by exposure to light, air, moisture, etc.

The use of a hog cholera virus of fixed virulence, with a control of dried serum and the use of a larger number of test pigs should serve to increase the accuracy of the standardization of anti-hog-cholera serum.

The careful standardizing is an essential fact in the successful use of hog cholera serum.

ADMINISTRATION AND USE OF HOG CHOLERA SERUM. There are two general methods of using hog cholera serum and both have their advocates. It is believed that one method may be adapted to a certain part of the country where another method would be dangerous. In those sections of the country where hog cholera is not prevalent, it is not considered advisable to use the simultaneous method on account of the danger of spreading the infection. The methods are as follows:—

(a) *Serum Alone Method.*

This method, as the name will imply, is the use of serum alone. The injections should be made on the inner sides of the thighs. Before giving the injection the temperature of the animal should be taken to determine whether or not there is any evidence of commencing cholera. Any animal having a temperature of over 104 should be recorded as suspicious. The average dose of serum used varies somewhat with the experience of the practitioner, but in a general way the average dose may be put down as follows:—

	cc.
10- to 25-pound pigs.....	10
25- to 50-pound shoats.....	15
50- to 75-pound shoats.....	20

75- to 100-pound shoats.....	25
100- to 125-pound hogs.....	30
125- to 150-pound hogs.....	35
150- to 200-pound hogs.....	40
200- to 250-pound hogs.....	50
All hogs weighing over 250 lbs..	60

In those cases where a high temperature is present, indicating the possibility of an on-coming attack of cholera, it is a wise measure to practically double the dose of serum. It is not claimed that the serum will cure animals sick of cholera, but a number of instances have been reported of encouraging results obtained from serum alone in animals in which the disease is just starting and do not show a temperature of more than 105. Where the animal is visibly very sick and the temperature is more than 107, it is of little value to give serum. The serum may be administered at any point of the body, either into the muscle or subcutaneously; but in small shoats, as aforesaid, the inner part of the thigh is selected, and in large hogs, where it is difficult to cast them, the serum may be administered back of the ear while the animal is held by a rope "snubbed" around the upper jaw.

(b) *Simultaneous Method of Treatment.*

In giving the simultaneous method of treatment to a herd, the work is done in just the same manner as for the serum alone method with the exception that a dose of the virus blood is also injected at the same time the serum is given. The virus and serum should not be mixed and injected together nor should they be injected at the same point. If the serum is injected into the muscles of the right hind leg, the virus should be given in the muscles of the left leg or at some other point of the body. The dose of virus varies the same as the serum, depending upon the weight and size of the animal. The following figures are the approximate doses in which the virus blood is recommended:—

10- to 25-pound pigs	$\frac{1}{4}$
25- to 50-pound pigs	$\frac{1}{2}$
50- to 75-pound shoats	$\frac{3}{4}$
75- to 100-pound shoats	$\frac{3}{4}$
100- to 125-pound shoats	1
125- to 150-pound shoats	1
150- to 200-pound hogs	$1\frac{1}{2}$
200- to 250-pound hogs	$1\frac{1}{2}$
All hogs over 250 pounds.....	$1\frac{1}{2}$ to 2

The dosage of the serum in the simultaneous method is the same as given under the serum alone method.

The injection of both the serum and virus should be done in a careful and cleanly manner and under strict aseptic conditions. In order to avoid bad after results the syringe used for the injections must be thoroughly sterilized and the needles should be kept in a solution of lysol between the injection of each animal. A number of needles will facilitate the work. The skin should be washed with a strong disinfectant solution and afterward painted with tincture of iodine at the point of insertion of the needle. If more than 40 cc. of serum are to be given it is advisable to inject it at two or more places. The animals following the treatment should be kept in a clean shady pasture lot or pens and away from mud-holes, barn-yards, etc. Animals should not be castrated or spayed until they have recovered from all effects of the treatment. It is advisable that very little food be given them for the first 24 to 48 hours following the treatment. All abscesses should be opened and drained. In the case of hogs developing abscesses from the injection of the virus blood, such animals should be isolated and the abscesses treated aseptically.

The disadvantages of the serum alone method is the fact that the immunity conferred by the serum does not last longer than from two to eight weeks. In exceptional cases it may last longer than this, but there are many instances on record where the immunity was lost in less than eight weeks. It therefore can be considered only a passive immunity and is applicable to herds in which the infection is not severe. In the use of the serum alone method of treatment, it is necessary to thoroughly disinfect the premises and dispose of all chances of later infection of the serum treated animals. The serious problem in the administration of the simultaneous method is the fact that these animals after being treated may become carriers of the infection of hog cholera the same as we have typhoid or diphtheria carriers in people. This belief is not held by all hog cholera workers, but there is still lacking sufficient evidence to disprove the assumption.

It is a known fact that where the simultaneous method of treatment has been advocated and generally used that there have been more outbreaks of hog cholera, though the death rate may not be so great as prior to the use of hog cholera serum. Again, in the simultaneous method the administration of the virulent virus blood should be done by one who is experienced in this work so that there may be no chance of the operator spreading infection over the

premises by the careless handling of this virus blood. It seems that it would be advisable to market the virus blood in a graduated syringe container ready for direct injection the same as diphtheria antitoxin and other biologic products are marketed to-day. This would avoid all exposure of the virus blood prior to or during the time of injection. The containers in which it is marketed should be destroyed by burning or thoroughly sterilized by boiling. We have left, however, the chance of the animal receiving the simultaneous treatment becoming a carrier and transmitter of the infection of hog cholera.

The simultaneous method may be used successfully in localities where hog cholera is extremely prevalent and the herds are at all times exposed to infection. The method naturally gives a much longer immunity. It is considered advisable by some men to double the dose of serum when the simultaneous method is used. This greatly increases the cost of the treatment.

From the experience of some men it seems unwise to give the simultaneous method to pigs under six weeks of age. They may be given the serum alone treatment and later the simultaneous treatment after weaning. Pigs from an immune mother apparently have a sufficient immunity until weaned.

It is strongly recommended to the veterinary profession generally that serum and virus be used from a manufacturer who is regularly licensed by the U. S. Department of Agriculture in accordance with an act approved March 4th, 1913 (See Appendix) to manufacture and sell hog cholera serum and virus. The labels on the packages will indicate whether the product has been prepared under such a license. This law cannot be too highly commended, and if rigidly enforced it will do much to bring about uniformity in these products as well as prevent worthless serum or virus being placed on the market. It must be remembered, however, that there are some state laboratories that are producing a very reliable product who do not require a license to operate within their own state.

At the eighteenth annual meeting of the U. S. Livestock Sanitary Association, Reichel of Pennsylvania gave a report upon the Refinement of Hog Cholera Serum in which he stated that the preparation of hog cholera serum globulin from hog cholera serum is an entirely practical procedure, and with proper facilities the increased labor will add but slightly to the cost of the production of the individual dose. He informs the writer in a private com-

munication that it has been proven to be a rather simple matter to recover all of the globulins from a given lot of hog cholera serum, and can bring the globulins into solution in one-fourth the original volume. He has found that he can concentrate uniformly hog cholera serum to one-third the original volume, so that 5 cc. of the concentrated serum will protect test pigs as satisfactorily as 15 cc. of the original material.

If it is found that the cost of concentration and the refinement of hog cholera serum is not prohibitive, it will certainly greatly improve the product, for it eliminates all inert material and thereby quicker absorption is obtained. The product is sterile when finished, which is another great advantage.

TREATMENT OF HOGS SICK WITH CHOLERA. In regard to the *medicinal* treatment of hogs sick with cholera, little can be said. A great many preparations have been advocated, all of which proved to have little or no curative value. The treatment indicated is to support the strength, improve the appetite and regulate the bowels.

Some years ago the late Dr. D. E. Salmon of the Bureau of Animal Industry devised a formula which has been found to be of value in stimulating the appetite and overcoming the digestive disorder. However, it is not to be considered a cure in any sense and in no way is to be compared to serum as a preventative. It is as follows:—

Wood Charcoal	1 pound
Sulphur	1 pound
Sodium Chloride	2 pounds
Sodium Bicarbonate	2 pounds
Sodium Hyposulphite	2 pounds
Sodium Sulphate	1 pound
Antimony Sulphide	1 pound

These ingredients are to be well mixed together and given in a dose of a tablespoonful once daily to each 200 lbs. of body weight. Any further *medicinal* treatment depends upon the symptoms of the animal.

In the case of animals that are not distinctly sick and have a temperature ranging between 104° F. and 106° F. may be given large doses of serum alone. If any benefit is to be derived from the serum it should be very potent and given in much larger dosage than for the preventative treatment. Animals markedly sick and with a high temperature do not respond to any form of treatment.

APPENDIX. An act of Congress approved March 4th, 1913 vests in the Secretary of Agriculture the power to prescribe regulations for the production of hog cholera serum and virus as well as other viruses, serums, toxins and analogous products. Some of the main features contained in these regulations pertaining to hog cholera plants are rules which require a complete separation of all virus and serum and entirely separate equipment for the preparation of these products. Adequate space should be provided for all procedures. A sufficient amount of natural or artificial light should be supplied for all parts of the establishment. The construction of the plant should be of such a nature that all rooms, pens, yards, etc., may be easily and thoroughly cleaned and disinfected. All rooms, pens, alley-ways, yards, etc., should be appropriately drained and guttered. Arrangements should be made so that hogs furnishing virus or serum may be entirely prepared for bleeding before they are taken into the rooms in which blood is collected, and the rooms in which blood is collected should be used for that purpose only. Immediately after the blood has been collected the animal furnishing it should be removed.

In order to meet all requirements it is necessary for establishments to be under the personal supervision of a competent man at all times while they are in operation.

An extract of the law and the regulations for its enforcement are herewith quoted:—

“An act making appropriations for the Department of Agriculture for the fiscal year ending June thirtieth, nineteen hundred and fourteen,” approved March 4, 1913.

“That from and after July first, nineteen hundred and thirteen, it shall be unlawful for any person, firm or corporation to prepare, sell, barter, or exchange in the District of Columbia, or in the Territories, or in any place under the jurisdiction of the United States, or to ship or deliver for shipment from one State or Territory or the District of Columbia, any worthless, contaminated, dangerous or harmful virus, serum, toxin, or analogous product intended for use in the treatment of domestic animals, and no person, firm or corporation shall prepare, sell, barter, exchange, or ship as aforesaid any virus, serum, toxin, or analogous product manufactured within the United States and intended for use in the treatment of domestic animals, unless and until the said virus, serum, toxin, or analogous product shall have been prepared, under and in compliance with regulations prescribed by the Secretary of Agriculture, at an Establishment holding an unsuspended and unrevoked

license issued by the Secretary of Agriculture as hereinafter authorized. That the importation into the United States, without a permit from the Secretary of Agriculture, of any virus, serum, toxin or analogous product for use in the treatment of domestic animals, and in the importation of any worthless, contaminated, dangerous, or harmful virus, serum, toxin, or analogous product for use in the treatment of domestic animals, are hereby prohibited. The Secretary of Agriculture is hereby authorized to cause the Bureau of Animal Industry to examine and inspect all viruses, serums, toxins, and analogous products, for use in the treatment of domestic animals, which are being imported or offered for importation into the United States, to determine whether such viruses, serums, toxins, and analogous products are worthless, contaminated, dangerous, or harmful, and if it shall appear that any such virus, serum, toxin, or analogous product, for use in the treatment of domestic animals, is worthless, contaminated, dangerous, or harmful, the same shall be denied entry and shall be destroyed or returned at the expense of the owner or importer. That the Secretary of Agriculture be, and hereby is, authorized to make and promulgate from time to time such rules and regulations as may be necessary to prevent the preparation, sale, barter, exchange, or shipment as aforesaid of any worthless, contaminated, dangerous, or harmful virus, serum, toxin, or analogous product for use in the treatment of domestic animals, and to issue, suspend, and revoke licenses for the maintenance of establishments for the preparation of viruses, serums, toxins, and analogous products, for use in the treatment of domestic animals, intended for sale, barter, exchange, or shipment as aforesaid. The Secretary of Agriculture is hereby authorized to issue permits for the importation into the United States of viruses, serums, toxins, and analogous products, for use in the treatment of domestic animals, which are not worthless, contaminated, dangerous, or harmful. All licenses issued under authority of this Act to establishments where such viruses, serums, toxins, or analogous products are prepared for sale, barter, exchange, or shipment as aforesaid, shall be issued on condition that the licensee shall permit the inspection of such establishments and of such products and their preparation; and the Secretary of Agriculture may suspend or revoke any permit or license issued under authority of this Act, after opportunity for hearing has been granted the licensee or importer, when the Secretary of Agriculture is satisfied that such license or permit is being used to facilitate or effect the preparation, sale, barter, exchange, or shipment as aforesaid, or the importation into the United States of any worthless, contaminated, dangerous, or harmful virus, serum, toxin, or analogous product for use in the treatment of domestic animals. That any officer, agent, or employee of the Department of Agriculture duly authorized by the Secretary of Agriculture for the purpose may, at any hour during the daytime or night time, enter and inspect any establishment licensed under this Act where

any virus, serum, toxin, or analogous product for use in the treatment of domestic animals is prepared for sale, barter, exchange, or shipment as aforesaid. That any person, firm, or corporation who shall violate any of the provisions of this Act shall be deemed guilty of a misdemeanor, and shall, upon conviction, be punished by a fine of not exceeding \$1,000 or by imprisonment not exceeding one year, or by both such fine and imprisonment in the discretion of the court."

REGULATION 1

"For the purpose of these regulations viruses, serums, toxins, and analogous products shall include all viruses, serums, toxins, and analogous products intended for use in the treatment of domestic animals. Among such analogous products are antitoxins, vaccines, tuberculins, malleins, microorganisms, killed microorganisms, and products of microorganisms.

REGULATION 2

"No person, firm, or corporation shall prepare, sell, barter, or exchange in the District of Columbia, or in any territory of the United States or in any place under the jurisdiction of the United States, or ship or deliver for shipment from one State or Territory or the District of Columbia to any other State or Territory or the District of Columbia any virus, serum, toxin, or analogous product manufactured within the United States unless and until the said virus, serum, toxin or analogous product shall have been prepared at an establishment holding an unsuspended and unrevoked license issued by the Secretary of Agriculture.

REGULATION 3

"Each establishment in the United States at which any virus, serum, toxin, or analogous product is prepared shall make application in writing to the Secretary of Agriculture for a license. When one competitor conducts more than one establishment a separate application shall be made for a license for each establishment. Blank forms of application will be furnished upon request addressed to the Bureau of Animal Industry, Washington, D. C.

REGULATION 4

"Sec 1. A license will not be issued unless the condition of the establishment and the methods of preparation are such as reasonably to insure that the product will accomplish the objects for which it is intended, and that such product is not worthless, contaminated, dangerous, or harmful.

Sec. 2. A license will be issued only after inspection of the establishment by a duly authorized officer, agent, or employee of the Bureau of Animal Industry has shown that the condition and equipment of the establishment and the methods of preparation are in conformity with these regulations.

REGULATION 5

"Section 1. Each license shall terminate at the end of the calendar year during which it is issued.

"Sec. 2. A license shall be reissued only after inspection of the establishment by a duly authorized officer, agent, or employee of the Bureau of Animal Industry.

Sec. 3. A license will not be issued for the preparation of any virus, serum, toxin, or analogous product if advertised so as to mislead or deceive the purchaser or if the package or container in which the same is intended to be sold, bartered, exchanged, or shipped, bears or contains any statement, design, or device which is false or misleading in any particular.

REGULATION 6

"Licenses shall be in the following form:

United States Veterinary License No.....

Washington, D. C.,.....19....

This is to certify that, pursuant to the terms of the act of Congress approved March 4, 1913 (37 Stat., 832), governing the preparation, sale, barter, exchange, shipment, and importation of viruses, serums, toxins, and analogous products intended for use in the treatment of domestic animals.....is hereby licensed to maintain, at.....Street, city or town of.....State of.....an establishment for the preparation of.....during the calendar year 19....

This license is subject to suspension or revocation if the licensee violates or fails to comply with any provision of said act approved March 4, 1913, or of the regulations made thereunder

Countersigned:

.....
Secretary of Agriculture.

.....
Chief Bureau of Animal Industry.

REGULATION 7

"Section 1. Each separate container of virus, serum, toxin, or analogous product prepared, sold, bartered, exchanged, shipped, or delivered for shipment shall bear the true name of the product and the license number assigned by the department, in the following manner: 'U. S. Veterinary License No.....' or an abbreviation thereof authorized by the Bureau of Animal Industry.

"Sec. 2. Each separate container of virus, serum, toxin, or analogous product shall bear a serial number affixed by the licensee for identification of the product with the records of preparation thereof. Each container shall also bear the 'return date.'

REGULATION 8

"A license will be suspended or revoked (1) if it appears that the construction of the establishment licensed is defective, or if the establishment is improperly conducted; (2) if the methods of preparation are faulty, or if the products contain impurities or lack potency; (3) if the products are advertised or labeled so as to mislead or deceive the purchaser in any particular; (4) if the license is used to facilitate or effect the preparation, sale, barter, exchange, or shipment of any worthless, contaminated, dangerous, or harmful

virus, serum, toxin, or analogous product; or (5) if the licensee violates or fails to comply with any provision of said act approved March 4, 1913, or of the regulations made thereunder

REGULATION 9

"Section 1. Each importer of any virus, serum, toxin, or analogous product shall make application in writing to the Secretary of Agriculture for a permit. The application shall specify the port or ports of entry at which the imported articles will be cleared through the customs. Blank forms of application will be furnished upon request addressed to the Bureau of Animal Industry, Washington, D. C.

"Sec. 2. Each application for a permit shall be accompanied by the affidavit of the actual manufacturer, produced before an American consular officer, stating that the virus, serum, toxin, or analogous product mentioned therein is not worthless, contaminated, dangerous, or harmful, whether the product was derived from animals and, if so derived, that such animals have not been exposed to any infectious or contagious disease, except as may be essential in the preparation of the product and as specified in the affidavit.

"Sec. 3. Each application for a permit shall be accompanied by the written consent of the actual manufacturer that properly accredited officers, agents, and employees of the Department of Agriculture shall have the privilege of inspecting, without previous notification, all parts of the establishment at which such virus, serum, toxin, or analogous product is prepared, and all processes of preparation of such products, at such times as may be demanded by the aforesaid officers, agents or employees.

"Sec. 4. Each permit shall terminate at the end of the calendar year during which it is issued.

REGULATION 10

"Permits shall be in the following form:

United States Veterinary Permit No.....

Washington, D. C.,.....191...

This is to certify that pursuant to the terms of the act of Congress approved March 4, 1913 (37 Stat., 832), governing the preparation, sale, barter, exchange, shipment, and importation of viruses, serums, toxins, and analogous products intended for use in the treatment of domestic animals,.....State of....., is hereby authorized, so far as the jurisdiction of the Department of Agriculture is concerned, to import.....manufactured by.....of....., into the United States through the port of....., during the calendar year 19....

This permit is subject to suspension or revocation if the per-

mittee violates or fails to comply with any provision of the said act approved March 4, 1913, or of the regulations made thereunder.
(L. S.)

Countersigned:

.....
Secretary of Agriculture

.....
Chief Bureau of Animal Industry.

The bureau of Animal Industry shall give prompt notice of the issue of each permit to collectors of customs at the ports of entry named therein.

REGULATION 11

"Section 1. Each separate container of virus, serum, toxin, or analogous product imported shall bear the true name of the product and the permit number assigned by the department, in the following manner: 'U. S. Veterinary Permit No.' or an abbreviation thereof authorized by the Bureau of Animal Industry.

Sec. 2. Each separate container of virus, serum, toxin, or analogous product imported shall bear a serial number affixed by the manufacturer for identification of the product with the record of preparation thereof. Each container shall also bear the 'return date.'

"Sec. 3. A permit will not be issued for the importation of any virus, serum, toxin, or analogous product if advertised so as to mislead or deceive the purchaser or if the package or container in which the same is intended to be sold, bartered, exchanged, shipped, or imported bears or contains any statement, design, or device which is false or misleading in any particular.

REGULATION 12

"Permits will be suspended or revoked (1) if it appears that the construction of the establishment in which the products are prepared is defective, or if the establishment is improperly conducted; (2) if the methods of preparation are faulty, or if the products contain impurities or lack potency; (3) if the products are advertised or labeled so as to mislead or deceive the purchaser in any particular; (4) if the permit is used to facilitate or effect the importation of any worthless, contaminated, dangerous, or harmful virus, serum, toxin, or analogous product; or (5) if the permittee violates or fails to comply with any provision of said act approved March 4, 1913, or of the regulations made thereunder.

REGULATION 13

"Any officer, agent or employee of the Department of Agriculture, duly authorized for the purpose, shall be permitted to enter any establishment licensed under these regulations at any hour during the daytime or night time, and such duly authorized officer, agent, or employee shall be permitted to inspect, without previous notification, the entire premises of the establishment, including all compartments and buildings, and all equipment, such as chemicals,

instruments, apparatus, etc. as well as the methods used in the preparation, handling, and distribution of virus, serum, toxin, or analogous product.

REGULATION 14

"No grinding or mixing machinery, molds, instruments, tables, or other apparatus which come in contact with virulent or attenuated micro-organisms or toxins shall be used in the preparation of other forms of biological products.

REGULATION 15

"All equipment, containers, machinery, instruments, and other apparatus used in the preparation of viruses, serums, toxins, or analogous products shall be thoroughly sterilized before use by live steam at a temperature of at least 120 degrees Centigrade for not less than half an hour or exposed to dry heat of at least 160 degrees Centigrade for at least one hour. If for any reason such sterilization can not be applied, then a process known to be equally efficacious in destroying microorganisms and their spores may be substituted.

REGULATION 16

"Permanent detailed records of the methods of preparation of viruses, serums, toxins, and analogous products, including sources of bacterial cultures or viruses used, virulence of such cultures or viruses, methods of testing the purity and potency of the product, together with the methods of preservation, shall be kept by each licensed establishment.

REGULATION 17

"Section 1. The stables or other premises used for experiment animals in the production or testing of viruses, serums, toxins, or analogous products shall be properly ventilated and lighted, appropriately drained and guttered, and kept in good sanitary condition. Animals infected with or exposed to any infectious, contagious, or communicable disease shall be properly segregated, and all instruments, containers, and other apparatus shall be thoroughly cleaned and sterilized before use. Establishments shall be so located as to avoid the spread of disease, and suitable arrangements shall be made for the disposal of all refuse.

"Sec. 2. Viruses, serums, toxins, and analogous products shall be prepared, handled, and distributed with due sanitary precautions.

REGULATION 18

"When the preparation of viruses, serums, toxins, and analogous product has been completed, said products shall be stored in a cold chamber or refrigerator for preservation until such time as they are removed from the premises. All dealers in the District of Columbia or any Territory or any place under the jurisdiction of the United States shall keep such products under refrigeration until sold or otherwise disposed of.

REGULATION 19

"Section 1. Samples of viruses, serums, toxins, and analogous products shall be collected by authorized officers, agents, or employees of the Department of Agriculture.

"Sec. 2. Samples may be purchased in the open market, and the marks, brands, or tags upon the package or wrapper thereof shall be noted. The collector shall note the names of the vendor and the agent of the vendor who made the sale, together with the date of purchase. The collector shall purchase representative samples.

"Sec. 3. All samples or parts of samples shall be sealed by the collector and marked with identifying marks.

REGULATION 20

"The immunity unit for measuring the strength of tetanus antitoxin shall be 10 times the least quantity of antitetanic serum necessary to save the life of a 350-gram guinea pig for 96 hours against the official test dose of the standard toxin furnished by the Hygienic Laboratory of the United States Public Health Service.

REGULATION 21

"Section 1. Licenses or permits may be suspended or revoked after opportunity for hearing has been granted to the licensee or importer at times and places designated by the Secretary of Agriculture. All hearings shall be private and confined to questions of fact. The parties interested may appear in person or by attorney, and may submit oral or written evidence on the question of fact involved.

"Sec. 2. If, after opportunity for hearing has been granted, it appears that a licensee or permittee has violated or failed to comply with any provision of said act approved March 4, 1913, or of the regulations made thereunder, the license or permit may be suspended or revoked."

On Sept. 15th, 1915, the above regulations were amended by the additions of the three following regulations:—

REGULATION 22

"Section 1. All antihog-cholera serum and hog-cholera virus shall be prepared, handled, stored, marked, treated, and tested by the establishment in accordance with methods prescribed by the Chief of the Bureau of Animal Industry."

REGULATION 23

"Section 1. The following facilities, and such others as may be essential to efficient conduct of inspection, shall be furnished by each person, firm, or corporation licensed to prepare antihog-cholera serum and hog-cholera virus.

"Suitable rooms, compartments, or receptacles in such number and places as may be necessary for holding any viruses, serums, toxins, or analogous products for treatment or testing required in accordance with these regulations. Such rooms, compartments, or

receptacles shall be equipped for secure locking and shall be held under locks furnished by the Department of Agriculture, the keys of which shall not leave the custody of employees of the Bureau of Animal Industry."

REGULATION 24

"Section 1. No animal from public stockyards, abattoir pens, or similar places; no animal which is infected with, or which has been exposed to, any infectious, contagious, or communicable disease shall be brought onto the premises of any licensed establishment at which any antihog-cholera serum or hog-cholera virus is prepared.

Sec. 2. No virus, serum, toxin, or analogous product which has not been prepared, handled, stored, marked, treated, and tested in accordance with methods prescribed by the Chief of the Bureau of Animal Industry, or which is worthless, contaminated, dangerous, or harmful, shall be brought onto the premises of any licensed establishment at which any antihog-cholera serum or hog-cholera virus is prepared.

"Sec. 3. Each licensed establishment shall adopt such measures as the Chief of the Bureau of Animal Industry shall, from time to time, prescribe for carrying out the provisions of this regulation."

RECOMMENDATIONS OF THE COMMITTEE

In conclusion the committee desires to make the following recommendations to veterinarians and swine owners relative to the prevention of hog cholera, namely:

1. The diagnosis should be made as early as possible after symptoms appear. This must be made in the field by the practitioner.

2. Every farm on which hog cholera is found should be quarantined against that disease. No one should be allowed to go near the affected hogs except those having charge of them and no one from these premises should go to other premises on which hogs are kept.

3. In herds that are infected the well hogs should be immunized with anti-hog-cholera serum and the sick ones given serum if indicated.

4. There should be rigidly enforced regulations, and statutes if necessary, that no hogs should be sent from infected farms to the market until at least two weeks after all evidence of disease had disappeared from the herd. As hog cholera virus is carried in the carcasses of infected hogs and the disease often spreads to uninfected territory by shipping infected carcasses, it is very important

that such animals should be kept out of the market. As the disease can, by the use of the serum, be checked in the herd there is no longer an economic reason for rushing apparently healthy hogs from infected herds to the market.

5. Strict sanitary regulations should be enforced by every hog raiser to prevent the entrance of the virus. We are confronted with the fact that while the serum seems to be more potent than heretofore, hog cholera is spreading more or less rapidly to uninfected territory. We must not confuse the protection of hogs in an infected herd with the control of the disease. No one who is interested in the eradication of hog cholera can consider the serum other than a most valuable temporary agent in solving a great sanitary problem.

6. The simultaneous method of using serum and virus should be restricted to those versed in its significance and carefully trained in the technique of administering viruses.

7. All hogs that are shown at fairs should receive serum alone not more than three weeks prior to shipping (preferably near date of shipping) and serum alone at intervals of twenty-one days while they are on the road, or else they should receive simultaneous treatment not less than three weeks prior to their departure for the showing. If simultaneous treatment is given the animals should be dipped before they are shipped.

—o—

PRESIDENT MARSHALL: You have now heard the report of the Committee on Diseases. Gentlemen, what will you do with this report?

DR. KINSLEY: I move that it be accepted.

DR. MOORE: I second the motion.

PRESIDENT MARSHALL: It has been moved and seconded that the report of the Committee on Diseases be accepted. Any remarks? If not, it is so ordered. Before we adjourn, I wish to state that the executive committee will meet in the morning at 8:30. The general session will meet in this room at 9:30 in the morning. Please be prompt for we are late with the program at the present time, and if we do not get together promptly, we will lose some valuable time. The motion to adjourn is in order. Adjournment.

Oakland, California, August 31, 1915.

The third business session of the fifty-second annual convention of the American Veterinary Medical Association was called to order by the President, Clarence J. Marshall, at 9:45 o'clock A. M.

PRESIDENT MARSHALL: The first thing on the program is the completion of the report of the executive committee.

DR. MAYO: I will read the names of the members admitted to membership, beginning where we left off last night. (Printed in the October number).

DR. MAYO: All those applicants whose names I have read have been approved by the executive committee, and recommended for election to membership in this association.

PRESIDENT MARSHALL: What is your pleasure, gentlemen, in regard to the applications presented by the executive committee?

DR. KINSLEY: Mr. President, I recall one name last year whose application was laid on the table and not voted on, Dr. Femaha, I believe was the name.

PRESIDENT MARSHALL: He is a member, Dr. Kinsley.

DR. KINSLEY: Mr. President, I move the rules be suspended and the secretary be instructed to cast the ballot of the association in favor of these gentlemen whose names have been read for election to membership of the association as recommended by the executive committee.

PRESIDENT MARSHALL: It has been moved and seconded that the rules be suspended and that the secretary be instructed to cast the unanimous ballot of the association in favor of the gentlemen whose names have just been read. All those in favor of the motion, signify by saying "aye". All those opposed by the same sign. It is carried.

DR. MAYO: In accordance with the resolution and motion I hereby cast the ballot of the association in favor of the several gentlemen whose names have been read, and which were presented last night and today.

PRESIDENT MARSHALL: There are just a few other things that should be taken up at this time and can be disposed of in five minutes, if you will permit. If there are no objections, the secretary will continue the reading of the report of the committee. His time is up, but if there are no objections, he may continue.

DR. MAYO: Roy Riddle of Winchester, Canada, has been recommended for expulsion from the association. I will say in explanation that Mr. Roy Riddle has been convicted of a crime and is serving sentence.

DR. HOSKINS: Mr. Chairman, I move the association accept the recommendation of the executive committee suspending Roy Riddle.

PRESIDENT MARSHALL: It has been moved and seconded that the recommendation of the executive committee expelling Roy Riddle be accepted. Any remarks? If not, it is so ordered.

DR. MAYO: The following resignations have been presented and the committee recommend that they be accepted:

Barnett, Joseph A. of Edwardsville, Illinois.

Belaire, George H. of Pembroke, Canada.

Bretz, S. E. of Nevada, Ohio.

Brown, Charles W. of Berkeley, California.

Fry, E. S., of Naperville, Illinois.

Hope, J. G. of the Union Stock Yards, of Chicago, Ill.

Massie, J. of Kingston, Ontario, Canada.

Morrison, William of Los Angeles, California.

C. Jones of Winnipeg, Manitoba.

DR. HOSKINS: I move that the recommendation of the executive committee that the above mentioned resignations be accepted, be approved. Seconded by Dr. Kinsley.

PRESIDENT MARSHALL: You have heard the motion, gentlemen. Any remarks? If not, it is so ordered. I wish to announce a few appointments on the different committees. Some of the regular committees are not present. It is necessary, therefore, to appoint others who are present to serve in the place of the absentees. The first is the finance committee, the regular committee was composed of James T. Glennon, Chairman, Charles R. Jolly and A. S. Cooley. As none of the gentlemen are present, I will appoint in the place of these men the following: chairman, George H. Hart, Frank Schneider and George W. Dunphy. The committee on necrology consists of W. Herbert Lowe, chairman, and the members of the committee are S. Brenton, George H. Berns, Orville L. Boor and A. Bostrom. As Dr. Brenton is the only member of that committee present I will appoint in place of the absentees the following: Dr. D. M. Campbell, Dr. Roberts, Dr. S. Stewart and Dr. Anderson. The next order of business is the report of the committee on finance. Is Dr. Hartman in the room? If not, we will pass to the report of the committee on publication. Dr. Mohler—is Dr. Mohler present?

DR. MOHLER: Mr. President, gentlemen of the convention, your committee on publication for the year 1913 and 1914 beg to submit the following report through me as chairman:

REPORT OF THE COMMITTEE ON PUBLICATION

“The preceding committee on publication contracted for the services of Mr. Charles F. Roberts as official stenographer with three assistants for the fiftieth annual meeting of the convention held at New York City, September, 1913. The expenses in connection with this stenographic work were considerably in excess of that at previous conventions owing to the unusually large number of papers presented and the division of the meeting into four sections each of which had to be covered continuously by a separate reporter. As a result the stenographic expenses for the fiftieth anniversary meeting exceeded the previous highest cost by over sixty per cent, as follows:

To attendance and reporting sessions of the executive committee and of session of A. V. M. A. meeting at New York, Aug. 30th to Sept. 1, 2, 3, 4, 5, 1913, at \$10.00.....	\$ 60.00
To traveling allowance per agreement.....	15.00
To 468 folios, copy at 15c.....	70.20
To 38 folios, executive committee reports at 15c	6.70
Paid John H. Holmes for services as assistant and reporter.....	154.40

Paid expenses of John H. Holmes.....	5.84	
Due L. W. Cogswell for services as assistant and reporter.....	154.40	
Paid expenses of L. W. Cogswell.....	9.25	
Due F. L. Knox for services as assistant re- porter	234.15	
Paid Hotel Astor for rooms for Messrs. Holmes, Cogswell and Knox.....	33.00	\$673.64
CREDIT.		
Sept. 5, 1913.....	\$200.00	
Nov. 8, 1913.....	473.64	\$673.64

Immediately following the appointment of this committee by President Marshall, invitations for bids to print the proceedings of the New York meeting were submitted to seven publishing houses in a letter somewhat similar to that used by preceding committees. As the result of a majority vote of your committee, the contract was awarded to the William J. Dornan Publishing Company of Philadelphia, and the substantial and attractive character of their production has caused very favorable comment and speaks for itself. The successful bid is herewith attached. It is gratifying to observe that although the anniversary meeting lasted five days instead of the customary four days, and consisted of as many as four section meetings at one time with consequent large increase in the number of papers and volume of discussions, the 2500 copies, each containing 1084 pages and weighing $4\frac{1}{4}$ pounds, were contracted for at \$3434.98, or \$1.37 per copy. Adding to this cost of printing that of distribution, stenographic charges and incidental expenses, the price per copy becomes \$2.00, or the same cost as the 1911 volume, and but 20 cents more than the 1912 volume. The fiftieth anniversary number greatly exceeds in volume that of any former year in the history of the association, and contains over fifty per cent more pages than the preceding report. The editorial work which this has imposed upon your committee, while onerous and exacting, has been a source of much pleasure and gratification.

The distribution of the copies of the proceedings began in January, 1914, which, considering the great amount of work connected with this production, was possible only through the hearty co-operation of the publishers and those who took part in the program. Most of the books were distributed by mail, which owing to the weight, cost 35 cents per copy for postage. Had your committee been slower in preparing the manuscript for publication, consider-

able saving in distributing expense would have occurred, as the Post Office Department on March 27, 1914, modified its regulations so that instead of sending the books as third-class matter at one cent for two ounces, we could have mailed them by parcel's post for as low as nine cents per volume.

At the New York meeting of the association the subject of a wider distribution of the proceedings was again revived, which resulted in the adoption of a resolution authorizing the librarian to forward copies of the report to certain specified veterinary colleges and similar institutions in foreign countries. Your committee, being supplied with the names of all these various institutions throughout the world which should receive a copy of the report, obtained the approval of librarian Frost to forward copies through the International Library Exchange of the Smithsonian Institute without expense to our association. As a result it has been the pleasure of your committee to see for the first time reviews of the proceedings of a highly satisfactory character in a number of foreign veterinary periodicals, and it is the opinion of the committee that a similar resolution should be adopted and made permanent this year in order that our publications may receive the attention they merit from those engaged in any line of veterinary work. The expense incident to publishing extra copies for this purpose was at the rate of \$55.00 per hundred copies, a very insignificant cost for making our association a world power in the veterinary profession.

The thanks of the committee are hereby extended to the *American Veterinary Review* for its kindness in loaning two half-tone plates of the officers of the association for the proceedings.

The usual letter inviting bids for the stenographic work incident to reporting the proceedings of the Oakland, California, meeting, August 30 to September 2, 1915, was forwarded to six individuals, and the majority of your committee voted that it would be most economical and satisfactory to accept the lowest bid submitted, that of B. C. Spencer, the official stenographer of the Missouri Valley Veterinary Association for the last five years.

The total disbursements made under the directions of this committee are summarized as follows:

November, 1913, Mr. C. F. Roberts, per contract...	\$ 673.64
February, 1914, William J. Dornan Publishing Co.,	
bill approved.....	3434.98
February, 1914, postage for mailing reports.....	662.10

June, 1914, Chairman Publication Committee, salary
and incidental expenses..... 324.55

\$5095.27

Through the courtesy of the *American Journal of Veterinary Medicine* free advertisement was given to this anniversary volume for the purpose of selling some extra copies. The proceeds from such sales which will be referred to in the librarian's report should be credited to the expense of publication.

Respectfully submitted

J. R. MOHLER, Chairman,

R. W. ELLIS

J. H. BLATTENBERG

N. S. MAYO

WARD GILTNER

WILLIAM J. DORNAN

Rittenhouse Building, Nos. 701-709 Arch Street
Philadelphia, 11-12-13.

MR. JOHN R. MOHLER,
Washington, D. C.,

DEAR SIR:—

We are pleased to estimate printing, paper, binding, wrapping and addressing—2000 copies AMERICAN VETERINARY MEDICAL ASSOCIATION, as follows:

Plain matter—\$2.58 per page.

6 point Tabular—\$7.00 per page.

Alterations—90 cents per hour.

Each additional page over 1000 pages—\$2.58.

Each additional 100 copies, 1000 pages—\$55.00.

2000 inserts printed on coated paper—\$8.00 for each insert.

Zinc cuts 7 cents per square inch, minimum 70 cents.

Halftone cuts 18 cents per square inch, minimum \$2.00.

Photographs to be supplied by customer.

This estimate is based on binding the book in cloth, gold stamp on back, blind fillet 2 sides, plain edges. If gold tops, 5 cents per book extra.

Very truly yours,

WILLIAM J. DORNAN.

Dummy enclosed with book sent by express prepaid.

PRESIDENT MARSHALL: Gentlemen, you have heard the report of the publication committee. What is your pleasure,

DR. KINSLEY: I move it be adopted. Seconded.

PRESIDENT MARSHALL: It has been moved and seconded that the report of the publication committee as read by Dr. Mohler be adopted. All those in favor of the motion signify by the usual sign; those opposed by the same sign. It is carried. It is so ordered.

In order to facilitate the work of the executive committee, it has been deemed advisable to have some of the reports of the various officers presented for our consideration at this time. These are scheduled according to the printed program to be presented Thursday afternoon, but if there is no objection we would like to have these reports presented at this time, and will now hear the report of the Secretary-Treasurer and Librarian at this time. If there are no objections, Dr. Mayo will read his report as Secretary.

DR. MAYO: I will first read the report of the Librarian as it bears somewhat upon the report of the publication committee. The report of the librarian covers the period from August 1st, 1913 to August 1st, 1915. (Printed in the October number).

PRESIDENT MARSHALL: Gentlemen, you have heard the report of the Librarian. What do you wish to do with it?

DR. KINSLEY: I move that it be adopted, accepted and referred to the executive committee.

PRESIDENT MARSHALL: Any remarks? If there are no objections, it is so ordered.

(The secretary's report was printed in the October number).

DR. JENSEN: Dr. Mayo, I am advised that Dr. R. R. Hammond, at Geneseo, Iowa, and Dr. W. E. Ralston, at Pullman, Washington, are dead.

PRESIDENT MARSHALL: I also am informed that Dr. James A. McClosky is also dead.

DR. KINSLEY: I move that the report of the secretary be accepted and referred to the executive committee.

PRESIDENT MARSHALL: It has been moved and seconded that the report of the secretary be accepted and referred to the executive committee. Any remarks? If not, it is so ordered.

DR. MAYO: Dr. Campbell will present the report of the treasurer, but before that is done I wish to go upstairs and get the printed report for distribution so that all may have a copy before them while it is being read.

PRESIDENT MARSHALL: While Dr. Mayo is gone we will hear the report of the finance committee, which Dr. Hart, the chairman will read. (Printed in the October number).

PRESIDENT MARSHALL: Gentlemen, you have heard the report of your finance committee. What is your pleasure?

DR. KINSLEY: I move that the report be received. Seconded by Dr. Hoskins.

PRESIDENT MARSHALL: It has been moved and seconded that the report of the finance committee be accepted. All those in favor of the motion signify by saying "aye"; those opposed "no." Carried. It is so ordered.

Dr. Campbell then read the report of the treasurer. (Printed in the October number).

PRESIDENT MARSHALL: Gentlemen, what will you do with this report?

DR. HOSKINS: I move it be received. Seconded by Dr. Jensen.

PRESIDENT MARSHALL: It has been moved and seconded that the report of the treasurer be received. All those in favor signify by saying "aye"; those opposed "no." It is carried. The report is received.

The next order of business is the report of the Committee on Necrology. Dr. Campbell, who is to make that report is not present at this time. The next on the program is the report of the committee on resolutions. Dr. Mohler, is your report ready?

DR. MOHLER: I do not think it is ready now, Mr. President.

PRESIDENT MARSHALL: Is Dr. Rutherford present? If not, we will postpone the reading of the report of the international tuberculosis commission by Dr. Rutherford, chairman.

DR. V. A. MOORE: Dr. Rutherford has called a meeting of that committee for three o'clock this afternoon. We will have to have a little more time to make a report.

PRESIDENT MARSHALL: We have a little more time yet to spend if Dr. Hoskins is ready, and he informs me that he is, we will now hear the report of the Committee on Legislation, if there are no objections. (Printed in the October number).

PRESIDENT MARSHALL: You have heard the report of the committee on legislation. What is your pleasure?

DR. KINSLEY: I move that the report of the legislative committee be accepted. Seconded.

PRESIDENT MARSHALL: A motion has been made and seconded that this report be accepted. Any remarks? If not, all those in favor of the motion say "aye"; opposed "no." Carried. It is so ordered.

DR. JENSEN: Mr. Chairman, it seems to me, if I am not out of order, that this association is greatly indebted to Dr. Hoskins for the untiring energy of this committee, and I move you that a vote of thanks be extended to the doctor for the work he has done in this respect. Seconded.

PRESIDENT MARSHALL: Any remarks? If not, gentlemen, you have heard the motion. All in favor of that, stand up. I am pleased to announce that everybody has stood up except Dr. Hoskins, which was entirely proper. The vote is unanimous and it is so ordered. That completes the regular program of the morning, and if anyone has anything else to say, we will have time to consider it now. If there is any unfinished business, we can take it up now.

DR. DALRYMPLE: Mr. Chairman, I wish you would advise us as to the personnel of the committee on resolutions.

PRESIDENT MARSHALL: The resolutions committee is as follows:

Dr. Melvin not being present, the chairman is Dr. E. H. Shepard, and the members are Dr. Dalrymple, Dr. Rutherford, Dr. Norton and Dr. Milton. I see that Dr. Shepard is now present and we will have his report.

DR. SHEPARD: I will say that the committee is not ready to report, and will ask if anyone has any resolution that they wish to have offered, that they present them to the committee as early as possible.

PRESIDENT MARSHALL: While we have nothing else before the house. Dr. Hoskins informs me he is prepared to offer a memorial in reference to Dr. Salmon, and if there are no objections, I think we might hear Dr. Hoskins's memorial address at the present time. (Printed in the October number).

(To be continued)

SOCIETY MEETINGS

MASSACHUSETTES VETERINARY MEDICAL ASSOCIATION

The monthly meeting of the Massachusetts Veterinary Medical Association was held at Worcester, on Wednesday, Sept. 15th. The members of the association were the guests of Mr. Harry Worcester Smith. Any person ever having been to Mr. Smith's estate or knowing Mr. Smith, knows what a good time was in store for the members. Besides an unlimited supply of refreshments of all kinds, the members were treated to an exhibition of pictures of jumpers and runners both past and present, their good and bad points being thoroughly explained by the owner. A tour was then made through the residence which was a real store house of antique furniture, silver, pictures, etc. This was followed by an exhibition of Mr. Smith's well known string of jumpers which showed to good advantage the excellent training which they have had. An exhibition of the different forms of jump, such as fence, brush, double and cross country, was then given us. This was followed by a trip through the kennels where Mr. Smith's fine packs of hounds were seen and greatly admired by the members.

The party returned to Worcester at 6 P. M., and met at the Hotel Bancroft. Fifty members and friends sat down to dinner after which the meeting was called to order by President Plaskett.

The records of the previous meeting were approved as read. Dr. Plaskett presented Mr. Smith with a shoe worn by the famous horse "Smuggler" which was owned by Howard Russell. The Secretary reported that the following members had been notified that according to the Constitution they were exempt from the further payment of dues:—Drs. John Winchester, W. A. Sherman, Wm. Peterson, Geo. Penniman, Austin Peters, Ben. Pierce, Lester H. Howard, Daniel Emerson, Alexander Burr, Thomas Blackwood.

On inquiry Dr. Howard spoke on the unusual outbreak of haemorrhagic septicaemia which has prevailed throughout the state of Massachusetts this year. Dr. Howard thought that the cause was due to the unusually heavy rains and the consequent inundations of land. Dr. Howard further stated that there has been a decrease of 50% in the cases of glanders in Boston this year which more than compensates for the slight increase in number of cases outside of Boston. He attributed a large part of the decrease to the fact that the watering troughs were closed, and said that the

year following the closure of the watering troughs showed a decrease of 40% in the number of cases as compared with six years previous to the closure.

Drs. Maloney, Lukes, Ben. Pierce, Abele and Penniman spoke and paid tributes to Mr. Smith as the true exponent of real sport. A committee composed of Drs. Winslow, Howard and Penniman were appointed to send a letter of congratulation to Mr. Laselle, on his winning the Grand Sweepstake. A rising vote of thanks was given Mr. Smith and the entire gathering joined in singing "For He's a Jolly Good Fellow." Adjourned at 9 P. M.

EDW. A. CAHILL, Secretary.

The regular monthly meeting of the Massachusetts Veterinary Medical Association was held at Young's Hotel, Boston, on Wednesday, Oct. 27th, at 5 P. M. The meeting was called to order by President Plaskett. The records of the last meeting were read by the Secretary. A correction was made by Dr. Howard to the effect that the decrease in cases of glanders in Boston for the past year has been 50% instead of 15%. Records approved as corrected. Dr. Pierce requested more time on his report on Dr. Buckley's diploma. The Committee appointed to draw up a letter of congratulation to Mr. Lasalle requested more time.

The following men were admitted to membership:

Dr. Edward F. Carey, Fall River.

Dr. William J. Glasgow, Springfield.

Dr. Michael J. Cone, Pittsfield.

Dr. M. E. Chapin, Springfield.

Dr. J. J. Moynahan, Holyoke.

Dr. Winchester remarked that he had received notice of the death of Madame Liautard, wife of our esteemed confrere, Dr. Liautard, of Paris, and suggested that a message of condolence be sent. Dr. Burr moved that a committee of two be appointed to draw up resolutions. President Plaskett appointed Drs. Burr and Winchester.

President Plaskett appointed Drs. Abele, Burr and White to constitute the Legislative Committee.

The special program for the evening consisted of an excellent address by Mr. H. C. Moore, President of the Pitman-Moore Company, of Indianapolis, on the production of anti-hog cholera serum and virus. Mr. Moore illustrated his remarks with stereopticon

views which were greatly enjoyed. Mr. Moore invited questions and criticisms and the meeting was resolved into a general discussion of hog cholera. About 40 members were present and this number was augmented by at least as many non-professional friends, most of whom were men owning large herds of swine. They all took part in the discussion and paid the highest tribute to the serum treatment. It was moved that a rising vote of thanks be given Mr. Moore for his excellent entertainment which was unanimously carried.

Dr. Peirce announced the program for the next meeting.

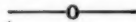
Dr. Miller of Fitchburg spoke regarding an insignia for the automobiles of veterinarians. Considerable discussion arose but no action was taken. Dr. Howard suggested that something similar to the pin worn by the A. V. M. A. members would be appropriate. He then complimented Mr. Moore on his address and stated that the Department of Animal Industry gave credit to the Pitman-Moore serum and virus for a large percentage of our good results.

Dr. Abele asked for information regarding eczema in cattle. Drs. Peirce and Howard in answer stated that several specimens had been examined from animals showing this condition, and that they showed a streptococcal and non-pathogenic bacterium. Dr. Abele further requested information on cattle from out of state coming into Massachusetts as regards foot-and-mouth disease, which was answered by Dr. Howard.

The meeting adjourned at 7:45, after which 40 members and friends sat down to dinner in the main café.

Respectfully,

(signed) EDW. A. CAHILL, Secretary.



HUDSON VALLEY VETERINARY MEDICAL SOCIETY

The first annual meeting of the Hudson Valley Veterinary Medical Society was held at Catskill, N. Y., November 3. There were about twenty-five veterinarians in attendance. The president, in his address, pointed out that while the society was only one year old, there is a membership of forty-one. The policy of the society has been not to have a formal program of papers, but to have one veterinary topic presented at each meeting with full discussion. At the Catskill meeting the topic for discussion was "Parturition and its Sequels". Those present entered into the discussion and a number of practical points were brought out. The following officers

were elected: President, D. B. Comstock, Albany; Vice-President, G. A. Knapp, Millbrook; Secretary-Treasurer, W. H. Kelly, Albany.

Board of Censors: Thos. O'Dea, Saugerties; L. L. Parker, Catskill; C. J. Hoyt, Walden; C. A. Roig, Poughkeepsie; George Eighmy, North Chatham.

It was voted that the next meeting should be held at Hudson, N. Y., February 2, 1916.

WM. HENRY KELLY, Secretary.

NECROLOGY

ALBERT BOULEWARE KELLY

Albert Bouleware Kelly of Albany, N. Y., died November 3, 1915 at the Medico-chirurgical hospital at Philadelphia, Pa. His death was caused by a fall from a ladder which resulted in a fracture at the base of the skull.

Dr. Kelly was born August 14, 1876 and was a graduate of the N. Y. State Veterinary College at Ithaca, N. Y. He was in practice a number of years at Albany and Delmar. A wife and daughter survive him. Interment in the Rural Cemetery at Albany.

J. G. Chrisman, late State Veterinarian of Texas.

COMMUNICATIONS

RABIES?

Editor Journal of the American Veterinary Medical Association, Ithaca, N. Y.:

Dear Sir:—I have read with considerable interest Dr. V. Schaefer's case report printed in the October JOURNAL (pages 57-60) by Dr. Ellis, with editor's comment. In my opinion his title ("Rabies?") well deserves the question mark. This is no uncommon disease in the Southern states. While State Veterinarian of South Carolina I saw quite a number of cattle, and a few mules affected with this disease. Farmers are familiar with this disease and term it "Mad Itch." I have held post mortem examinations in some instances but have never been able to discover anything abnormal other than an intense inflammation of the meninges of the brain.

I sent some heads to be examined but no Negri bodies were found. The following extracts from the enclosed press bulletin issued by my friend Dr. C. A. Cary may be of interest to your readers.

M. RAY POWERS.

INFECTIOUS ITCHING DISEASE

Press Bulletin No. 76
C. A. CARY, Auburn, Ala.

This disease has been called pseudo-rabies, mad itch, bulbar paralysis and "Disease of Aujeszky." It has existed for many years in various parts of America but was definitely described by Aujeszky, of Budapest, in 1902.

The cause of the disease is unknown but the records seem to indicate that it is a specific infection not transmitted by actual contact unless there be abrasions of the skin. It has been transmitted by inoculation. One material used was blood serum. The subcutaneous tissue at point of natural infection is very virulent and the urine of an infected animal is sometimes virulent. The brain is also virulent.

Susceptible animals are the horse, cattle, sheep, goats, dogs, cats, rabbits, guinea pigs and grey mice. Horses are said to be more susceptible than donkeys but I have seen in Alabama worse cases in mules than horses. Pigs, pigeons and fowls are said to be insusceptible.

The natural mode of entrance into the animal body is by subcutaneous or by cutaneous infection. It has been reported that food containing virulent products will transmit the disease. Subdural inoculation produces the disease with the shortest period of incubation. Intra-ocular, intra-venous, intra-peritoneal or intramuscular inoculations with virulent material always produce the disease in susceptible animals. The virus is supposed to spread in the animal body by the lymph vessels and nerves.

CLINICAL SYMPTOMS: Cattle. In cattle the infection usually starts somewhere about the head, the lips and nose; and the first signs are constant rubbing of the infected part followed very quickly by removal of hair, bleeding and inflammatory swellings.

The swelling usually extends from the point of infection involving the head, throat and sometimes the neck. The animal moans, moves the legs convulsively, scratches the head or infected part with the hind legs or rubs it upon some object, and there is often some salivation and paralysis of the throat so that the animal cannot swallow. The appetite of the animal may remain good but inability to swallow and possibly inactivity of digestion results in tympanitis or flatulency. As a rule the animals are nervous, show fright, sometimes sweat, grind the teeth and moan. As a rule, they die in twenty to forty-eight hours after the first symptoms appear. Post mortem appearances show the extension of the infection to be along the lymph channels. The lymph glands of the head are enlarged. Sometimes the capsule of the lymph node is injected and

nearly always edematous. There is rarely ever any systemic temperature. During the summer and fall of 1914 about 50 cases occurred in various parts of Alabama.

HORSES OR MULES: In horses or mules this trouble may be mistaken for rabies or forage poisoning. The rubbing of the skin, the head or the parts affected until they rub away large portions of skin and flesh is the characteristic symptom. Often times the animal does not show nervous irritability or any great variation from normal except the violent itching and rubbing and throat paralysis and sometimes general paralysis from secondary infection. Occasional salivation, grinding of the teeth and attempts at swallowing may be present.

TREATMENT: The experience of all veterinarians indicate that there is no specific treatment. In fact very few cases recover. Tincture of Iodine may be freely applied to the infected place and where possible the edematous enlargements be opened and tincture of Iodine or other antiseptics may be applied and if possible tie up the animal so that it cannot rub or scratch itself. When possible give purgatives and apply covering to protect the infected places so the animal cannot scratch or rub them.

To prevent it keep animals out of infected places and disinfect such places thoroughly before any other animals are introduced. I have long suspected that this trouble was due to some volatile poison like that found in poison ivy or other poisonous plants. As a preventive measure it might be well to eradicate such plants in a pasture where this disease occurs.

The intense itching in animals closely resembles that of poison ivy in man. I have long suspected that some cattle, or other animals were subject to skin irritations and infected by poison ivy plants. A cow or horse might nibble or eat such a plant as the three-leaved poison ivy vine (*Rhus Toxicodendron*) or the small tree or shrub with seven to thirteen leaflets (*Rhus vernix*). The volatile oil (Paff) or glucoside (Smye) could produce the intense itching irritation about the head or skin at any delicate or abraded part and, along with the rubbing and scratching, germ infection may occur to intensify the irritation of the terminal sensory nerves.

With this idea in view I suggest that owners of animals affected with itching disease apply freely and frequently early in its course one per cent solutions of permanganate of potash or iron sulphate (one per cent in water) solution, two or three times a day. Also give to cattle, horses and mules one to two pounds of Epsom Salts in one to two pints of water to remove from alimentary canal any of the plants that may have been swallowed. Or use one to two pints of raw linseed oil, olive oil, castor oil or warm lard.

Rabbits die in convulsions in twenty-four to forty-eight hours after subcutaneous injections of a fluid extract of *Rhus Toxicodendron*. Necrosis and sloughing may occur at the place of injection if the rabbit lives eight to fifteen days. Also nephritis is usually present. It is said that the above lesions occur with greater certainty

and regularity in guinea pigs (Paff). There is nothing said about there being itching or scratching of the place of inoculation.

I have obtained pus micrococi from the itching areas but have not reproduced the itching effects by direct inoculation with them.

Some have suspected that the itching disease was caused by dry irritating food with insufficient water. Others have attributed the disease to some toxic plant or germ. At present there is no definite or specific known cause of the disease.

—o—

SALMON MEMORIAL COMMITTEE

DR. J. F. WINCHESTER, Chairman

DR. W. HORACE HOSKINS, Sec'y-Treas.

DR. A. D. MELVIN

DR. S. BRENTON

DR. J. S. ANDERSON

DR. J. G. RUTHERFORD

DR. D. F. FOX

Dear Doctor:—At the 51st annual meeting of the A. V. M. A. the many suggestions, offerings and proposals for some fitting testimonial to the late Dr. D. E. Salmon, were given the fullest consideration and by a vote of the association and their selection the above named committee were elected to carry out the purpose of the following adopted recommendations:—

“1st.—That the Salmon Memorial Fund shall be undertaken by this body and that a stated committee will be appointed by this organization for the carrying out of the purpose of this movement.

“2nd.—That the form of testimonial shall be of an educational character, that may cover a scholarship, a fellowship, or some advanced or special work of interest or import to the veterinary profession, as may from time to time be recommended by this committee for action of the association.

“3rd.—That to this end a sum of monies of not less than ten thousand dollars be raised by popular subscription from the upwards of seventeen thousands of veterinarians in North America; this money to be invested under the direction of this association so that the income of four or five hundred dollars may be annually awarded to some one or more along the lines above referred to.

“4th.—That said scholarship or fellowship shall be in an American Veterinary College, and, if a fellowship, not to be taken in the college of which the successful person awarded the same shall be a graduate thereof.”

There are more than seventeen thousand veterinarians in the United States and Canada, all of whom owe a debt to our late co-laborer. The standing of our profession in North America and abroad has been largely contributed to by his lifetime of useful and sincere service. The form of testimonial must appeal alike to one and all in that it fittingly commends his life, that it will keep his memory green in the minds of the present and future profession and it will be a testimonial that will stimulate every young man to emulate his example of devoted, unselfish work for his profession.

Will you join with your fellow veterinarians in your immediate district and determine what you can do to aid this committee? May we invoke of you and your colleagues that you lay aside in approaching this duty every other thought, save that of the untiring and unselfish side of the more than twenty-five years of official service, that marked his splendid career.

Yours for this worthy cause,

W. HORACE HOSKINS, Sec'y-Treas.,
3452 Ludlow St., Philadelphia, Pa.

—o—

REVIEWS

VETERINARY POSOLOGY

GEORGE A. BANHAM, F.R.C.V.S AND WM. J. YOUNG, F.R.C.V.S., D.V.S.M.
Fourth Edition, 1915. Published by Alex. Eger, Chicago, Ill.

This little volume of 272 pages, bound in cloth, contains a great amount of valuable information for any practising veterinarian. Besides the tables on posology, classification of medicines, their therapeutic actions, incompatibles, diseases and their remedies, there are tables on the most important pathogenic bacteria, parasites affecting animals and protozoan diseases and their transmitters. Our space is too limited to consider the various topics in detail, but attention should be called to the tables on the percentage composition of feeding stuffs, digestive coefficients and rations for draught horses, as being especially useful for country practitioners who wish to qualify themselves in an advisory way in promoting their usefulness with their agricultural patrons.

The book has apparently been designed for English practitioners. Its utility in America would have been enhanced if the American equivalents of the weights and measures could also have been given as well as some recognition of the American pharmacopoeia. A table on the average alcoholic strength of some beverages, includes champagne and sherry which, in this country, might be considered rather extravagant for veterinary patients.

Directions are given for the administration of the subcutaneous and ophthalmic tuberculin tests, also the subcutaneous and conjunctival tests with mallein, and vaccination for swine fever and swine erysipelas. The authors are to be commended in bringing the volume up to date and for condensing so much valuable information for the practitioner into such small compass.

P. A. F.

ANAESTHESIA AND NARCOSIS OF ANIMALS AND BIRDS

FREDERICK T. G. HOBDAV, F.R.C.V.S., F.R.S.E.**Alex. Eger, Publisher, Chicago, Ill.**

This is a book of 82 pages including eleven chapters which refer to the selection of an anesthetic; method of preparation and securing of the patient; general anesthetics; stages of anesthesia; antidotal treatment; local anesthetics; intraspinal anesthesia; narcotics; the treatment of the patient when recovering from the effects of an anesthetic or narcotic; hints on the choice of anesthetics for the individual species of animal.

The author believes that the progress of anesthesia in veterinary surgery has not been so rapid as it should have been and one very commendable purpose of the book is the humane one of promulgating a wider use of the anesthetics upon veterinary patients. Inhalers are recommended and various forms are illustrated, particularly with reference to the horse and dog.

Tables are printed showing very satisfactory results with chloroform anesthesia upon 300 dogs, and reference is made to a list of 500 dogs in which there was only one fatality, and two which showed dangerous symptoms but recovered. The secret of safe chloroform anesthesia is the proper admixture of air. For the cat, monkey and young puppies the A. C. E. mixture or ether is recommended. The reference to birds is limited to the ostrich and chloroform is the anesthetic chosen.

Intraspinal anesthesia, while useful in human subjects, has not found very wide application in animals. This chapter deals principally with the researches of M. Mennerat. This gentleman practised the method successfully upon twenty-five cases principally upon old dogs in which chloroform anesthesia might have proved fatal. The injections were made between the sixth and seventh lumbar vertebrae. The technic is the same for the cat as for the dog. Because of the peculiar sensibility of the cat to chloroform and ether, it is believed this method will be of great service particularly in abdominal surgery.

Although the book is not large, it contains much useful information and if it serves the purpose of extending still further the use of anesthesia in veterinary patients it will accomplish a great and good object.

P. A. F.

MISCELLANEOUS

The next meeting of the Kansas Veterinary Medical Association will be held at Kansas City, Kansas, January 5 and 6, 1916.

Dr. J. G. Chrisman, late State Veterinarian of Texas, lost his life from becoming infected with anthrax while holding a post mortem examination upon a cow dead from that disease.—*Florida Health Notes*.

Under the order of the Secretary of Agriculture effective November 5, the quarantine on foot-and-mouth disease has been revoked in New York State. The entire state is now free from quarantine.

Dr. Geo. H. Koon, of the 7th Cavalry, at present in the Philippines expects to leave for the states in January or February.

TAKING NO CHANCES ON SERUM INFECTION. Infected serum will likely not again spread foot-and-mouth disease. Stringent requirements are now exacted of the serum plants in Illinois by the Department of Agriculture. All serum made in this state must now be subjected to a 3 week's test on calves before being shipped interstate. Shipments within the state are not subject to Federal control, but it is quite likely that recent experience has put serum-makers so thoroughly on guard that contamination of their product with the infection of foot-and-mouth scarcely is possible.—*Breeder's Gazette*.

Dr. A. Mitchell, stationed at Camp Stotsenburg, Pampanga Province, Philippines, is expecting to return to this country.

Dr. W. H. Dalrymple of Baton Rouge, La., has been the recipient of a fellowship in the American Medical Association. It is a worthy honor worthily bestowed. Recognition of veterinary merit is welcome in forging a stronger bond of union between the two professions. Our congratulations are extended to Dr. Dalrymple and the American Medical Association as well.

New Mexico boasts of a veterinarian 91 years of age.

The semi-annual convention of the Louisiana Veterinary Medical Association was held at Donaldsonville, La., October 15. The next meeting will be held at New Orleans, December 18.

Dr. A. L. Tiffany, a veterinarian of Monroe, Mich., and Secretary of the driving club, has been appointed by the board of Supervisors as live stock inspector for Monroe County.

THE DURAND CATTLE KILLED. The Guernsey cattle owned by Mrs. Scott Durand in Lake county of this state, which contracted foot-and-mouth disease and which were protected from slaughter some weeks ago by injunction, were killed on Tuesday afternoon. The Supreme Court dissolved the first injunction and on effort to kill the herd a second injunction was issued on the ground that the cattle had now recovered from the disease, and hence the state had no right to slaughter them. The attorney-general advised the governor that this second injunction was void, and Gov. Dunn addressed a letter to the sheriff of Lake county, asking him to aid the board of live stock commissioners in killing the cattle. With armed deputies the sheriff complied with the governor's request. Whatever legal complications may or may not follow, the cattle are underground, and the commissioners may now address their undivided attention to continuing their aid to the Federal authorities in the clean-up of McDonough county, where the situation is not so satisfactory as it might be.—*Breeder's Gazette*.

A later report states that Governor Dunn and Secretary of Agriculture Houston have been made defendants in a suit for \$100,000 brought by Mrs. Durand.

Dr. Fred E. Davis, for some time attached to the Bureau of Animal Industry as a veterinary inspector at St. Joseph, Mo., has been transferred to the station at Richmond, Va.

Dr. H. G. Carnes of Atlanta, Ga., was re-elected president of the Georgia State Veterinary Medical Association at its ninth annual meeting held at Macon. Dr. J. W. Salter was elected vice-president and Dr. Peter Bahnsen of Americus, secretary-treasurer. A resolution was passed to continue the prosecution of quack veterinarians.

Veterinarian Thomas E. Hutchings, coroner of Nicholas County, Kentucky was elected Live Stock Inspector of Nicholas County for the ensuing year.

At the November meeting of the New Orleans Academy of Sciences held at Tulane University, the paper of the evening was given by Dr. W. H. Dalrymple of the Louisiana State University on "The History of the Cattle Tick Fight in Louisiana."

Dr. J. W. Scott of Manchester, Iowa has sold his practice of 26 years standing to Dr. C. L. Morgan of Humboldt, Iowa.

A BIG STEP TAKEN IN STOPPING SALE OF TUBERCULAR CATTLE TO FARMERS. Almost anyone can carry on a crooked business for a certain length of time and come through without being caught, but it is generally the case that if they will follow it long enough and hard enough, sooner or later they are sure to get nipped. It seems that this is about to happen to a bunch of cow dealers over in Illinois. The following, which appeared in the *Chicago Tribune* will explain itself:

James Dorsey of Gilberts, Ill., millionaire cattle king of Kane county and president of the Elgin Road Race Association, yesterday was indicted by the federal grand jury. He is charged with using the mails in a scheme to defraud farmers by selling them cattle infected with tuberculosis under guarantee that the animals had been subjected to the tuberculin test and were free from the disease. It was returned before Judge Carpenter and contains three counts.

The inquiry into Dorsey's cattle operations was one of the speediest ever conducted by a federal grand jury. All witnesses were heard, the indictment drafted, voted and returned in court in less than six hours. Assistant District Attorney Michael L. Igo examined the witnesses.

The three counts in the indictment are based on three cattle transactions with farmers between October, 1912, and May, 1913. The three farmers who charged Dorsey with selling them tubercular cattle were witnesses before the grand jury. They are John T. Milek of Sturgis, S. D.; Norman F. Alderman of Brook Park, Minn., and William Spath of Lewistown, Mo.

Other witnesses were Dr. O. E. Dyson, state veterinarian, and Dr. A. Tyler of Elgin, a veterinarian who examined and passed Dorsey's cattle, and whose license to practice subsequently was revoked.

It is to be hoped that every effort will be made by the government officials in charge of this prosecution to ferret out the true facts and bring these people to justice. If they are guilty of the things that have been charged against them, a good, stiff penitentiary sentence would hardly seem adequate to punish them as they should be. State officials and farmers and live stock men should lend every assistance to this investigation and prosecution that a stop may be put to this kind of work for all time to come.

One who will be guilty of selling a cow claiming her to be free of tuberculosis when he positively knows this animal is affected

with this disease, will do almost anything. Numerous cases are on record where little children have been known to contract this terrible disease by drinking milk from tubercular cows. Can there be any punishment too severe for a man who will knowingly sell an animal of this kind not caring one iota whether this cow will be the means of giving one child or more this terrible disease?—*Twentieth Century Farmer*.

SERUM TESTS AND THE FOOT-AND-MOUTH DISEASE

Department of Agriculture's Official Statement
Of The Origin of Present Outbreak in Northern Illinois.

Washington, D. C., October 30, 1915. An official statement in regard to the recent reappearance in northern Illinois of the foot-and-mouth disease after it had been apparently stamped out early in the year, was issued today by the United States Department of Agriculture. From this statement it appears that the outbreak has now been definitely traced to an anti-hog-cholera serum prepared from the blood of hogs infected with foot-and-mouth disease but showing at the time the serum was manufactured no symptoms of the contagion. According to the statement, the serum was thoroughly tested before it was permitted to be placed upon the market, and the tests failed to reveal any evidence of contamination. After the recurrence of the disease in Illinois, samples of the serum were tested again and again by the Department of Agriculture and also tested by the United States Public Health Service. It was not until the sixty-second animal used in the tests had been inoculated with the serum, however, that the bacteriologists of the Department were able to produce any symptoms of foot-and-mouth disease.

The Department's statement is as follows:

In October, 1914 an outbreak of foot-and-mouth disease—the first in this country in six years—was discovered in the vicinity of Niles, Michigan. Despite thorough investigation the source of the infection remains unknown. It was learned, however, that before the occurrence was reported to Washington and the disease diagnosed by veterinarians familiar with it through experience in past outbreaks, animals from the infected area had reached Chicago. Owing to the extreme contagiousness of the disease, the Union Stock Yards were quarantined (October 31). Ordinarily several days or a week elapse between infection and the appearance of symptoms, and although there was no conclusive evidence on the point it was believed possible that the animals in question might have reached the yards in the incubative stage and infected them.

On November 1 this belief was strengthened by the discovery of the disease in the cattle being exhibited at the Dairy Show in the immediate vicinity of the yards. In the yards proper, however,

the first case did not appear until November 3. The next day foot-and-mouth disease was found among the hogs at the establishment of the Great Western Serum Company. This establishment was quarantined at once and at about the same time a precautionary quarantine was also placed upon another establishment, that of the Chicago Serum Company, located about a mile away, although no actual cases of the disease had been found at this second establishment. At that time the Chicago Serum Company had on hand approximately 101,000 cubic centimeters of anti-hog-cholera serum which had been prepared late in October. All this serum was placed under official seal by the inspectors of the Department and withheld from distribution.

During the ensuing six months the disease, which had spread widely over the country, was effectively combated by the slaughter of all exposed herds. It was then decided that the law required the Department to comply with the request of the Chicago Serum Company for a test of the serum in order that if it were found safe, it might be placed upon the market. The National Serum Law gives the Department no authority to refuse to permit the sale of a serum unless it is contaminated, dangerous, or worthless.

Arrangements were accordingly made by the Chicago Serum Company for a test under the supervision of the Department. Forty-one thousand cubic centimeters of the serum were thoroughly mixed and rebottled, and on June 30 samples were injected into eight small hogs. Two check-hogs were also included in the test. Although injections as large as 40 cubic centimeters were used, it is certain that none of these hogs developed foot-and-mouth disease. The test being thus absolutely negative—that is to say no indications of the disease resulting from it—the company was informed that it could ship out the serum to its customers.

On August 8 the inspector in charge of field inspection at Chicago telephoned to Washington that a case of foot-and-mouth disease had been discovered in a herd which had been inoculated with this serum in Cook County, Illinois. Pending investigation, all shipments of serum produced in Chicago were at once prohibited. As a result of the investigation it was found that serum from the Chicago Serum Company had been used on eleven herds of hogs, eight of which were in Illinois and one each in Minnesota, Michigan and Indiana. Inspection showed that eight of these herds were infected with foot-and-mouth disease, although only a very small percentage of the hogs in them manifested symptoms of the disease. All the animals were, however, slaughtered at once. The three herds in which no disease was found were also slaughtered without waiting to see whether they would subsequently develop the disease or not. This measure was necessary on account of the risk that the disease might be spread by the animals while in the incubative stage. As a result of the precaution no further cases have been reported from Michigan, Minnesota or Indiana.

In addition to these measures adopted to control the spread of the disease, samples of the serum actually used were procured from the owners of the infected herds and also samples of the remaining stock of the Chicago Serum Company. Pigs and calves, the animals which are most susceptible to foot-and-mouth disease, were inoculated with these samples. The results were again negative and after two series of tests had been made, the United States Public Health Service was asked to conduct a third series. This also was negative.

Up to this time, therefore, four series of tests had been made in which a total of 52 animals had been used. None of these 52 animals developed foot-and-mouth disease and the inoculations afforded no evidence that the serum was in any way contaminated. Each subsequent series apparently only confirmed the original test made before the serum was permitted to be placed upon the market. The fact remained, however, that herds treated commercially with the serum had developed foot-and-mouth disease. A fifth test therefore was made and ten days after inoculation, the sixty-second animal which had been used in the tests, a calf which had received thirty cubic centimeters, developed characteristic lesions. The diagnosis of foot-and-mouth disease was subsequently confirmed by the inoculation of other animals with material from the infected calf.

This is regarded as proof that the suspected serum actually was infected. Why the standard tests used on 61 animals failed to reveal this fact is a matter for scientific investigation and the bacteriologists of the Department are now at work upon the problem. At the time of manufacture, one-half of one per cent of carbolic acid was mixed with the serum to act as a preservative. It is now believed that the carbolic acid, acting as a germicide, may have attenuated or partially destroyed the virus to such an extent that what have previously been considered safe tests failed to establish the presence of the infection. It is also possible that the virus instead of being disseminated throughout the entire mass of serum, may have become agglutinated. This has been known to occur with germs of other diseases. The result would be the formation in the serum fluid of isolated clumps of foot-and-mouth disease virus, while the bulk of the serum remained free from these tiny masses. If this were the case, it is obvious that certain animals inoculated with the serum would develop foot-and-mouth disease and others would escape. Up to the present, it should be stated, scientists have not been able to identify the germ of foot-and-mouth disease although the economic importance of the plague in Europe has caused it to be studied exhaustively for many years.

In the Department, experiments are now being vigorously prosecuted with a view to discover a means of treating serum at the time of its manufacture which effectually will kill the virus of foot-and-mouth disease. The results so far attained are promising and the Department hopes that a successful method will be evolved shortly. In the meantime all the infected serum in the hands of the Chicago

Serum Company has been destroyed without compensation. All other serum manufactured in Chicago, which it was believed might contain possibilities of danger, has likewise been destroyed. Furthermore, the Department is prohibiting the shipment of any serum from licensed establishments in the districts that are under quarantine for foot-and-mouth disease.

The problem of producing serum which will be effective in controlling hog cholera and at the same time will be absolutely safe in general use is complicated by the fact that the Department of Agriculture has no authority over the serum plants which dispose of their products exclusively in the state in which they are manufactured. Such establishments are amenable alone to state law and regulation. The virus act confers no authority on the Department to guarantee or certify any commercial serum, nor does it provide for a continuous examination and inspection of serum establishments, such as the meat-inspection law provides for packing houses. The Department can only control serums and analogous products in interstate commerce when there is evidence that they are contaminated, dangerous or worthless, or when the manufacturer is not licensed to engage in such interstate business. The virus act was passed about two years ago, and within the short time intervening between its passage and the outbreak in 1914, and with the facilities available, the Department extended its inspection over serum plants just as far as the law and circumstances permitted. There were in October, 1914, about ninety serum plants holding Federal licenses, located at widely separated points in the United States. This condition rendered continuous inspection very expensive and impossible with funds legally available for the purpose.

The thirty-third annual meeting of the Illinois State Veterinary Medical Association is announced for December 2, 3 and 4, at the Lexington Hotel, Chicago. An interesting and important program has been prepared.

According to newspaper reports the hog cholera situation in Indiana is as bad or worse than it has been in recent years.

A Keokuk paper states that an Illinois veterinarian is stationed at the east approach of the Keokuk-Hamilton bridge and sterilizes and disinfects, without charge, all animals coming from the Illinois side. This will facilitate traffic with horse and mule-drawn vehicles.

In response to numerous inquiries from residents of Wyoming, State Veterinarian French has written a bulletin on Influenza and Strangles.